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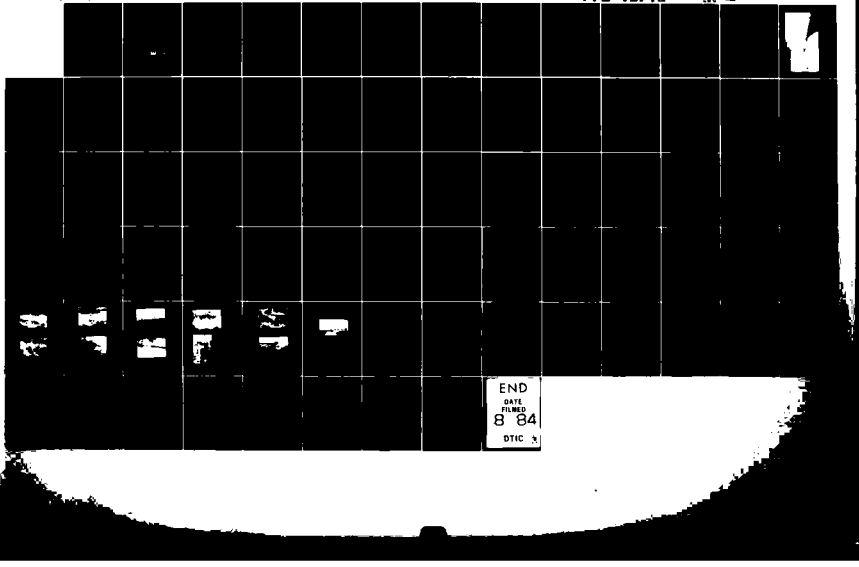

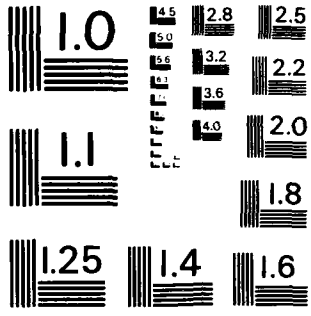

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NAUGATUCK RIVER BASIN

ANSONIA & SEYMOUR, CONNECTICUT

FOUNTAIN LAKE DAM
CT 00025

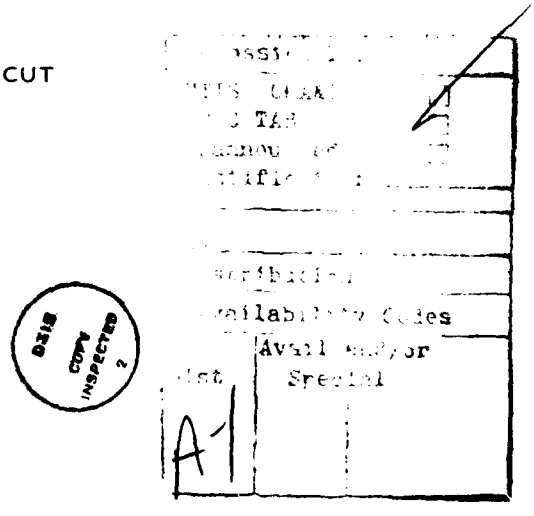
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MARCH 1980

FOUNTAIN LAKE DAM
CT 00025

NAUGATUCK RIVER BASIN
ANSONIA/SEYMOUR, CONNECTICUT



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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MARCH 1980

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Lake, Fountain
Naugatuck River, Ansonia & Seymour, Conn.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Dam consists of a mortared stone masonary structure with an upstream earth embankment and an overflow spillway located near the center of the dam. Maximum height is 20 ft. and overall lenght of 315 ft. The stone masonry wall has a top width of 6 ft., a downstream batter of 1 horizontal to 6.5 vertical and an unknown upstream batter. Therw's an 18 in. wide by 12 inch concrete wall at the upsteam edge of the masonry wall.The spillway consist of a concrete cap on the stone masonry wall. The crest length is 22.3 ft. and the freeboard from spillway crest to the top of the concrete wall is 1.7 ft. The outlet works consist of a 12 inch supply main from an upstream intake structure;

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00025

NAME OF DAM: Fountain Lake Dam

TOWN: Ansonia - Seymour

COUNTY AND STATE: New Haven County, Connecticut

STREAM: Unnamed tributary to the Naugatuck River

DATE OF INSPECTION: December 21, 1979

BRIEF ASSESSMENT

The Fountain Lake Dam consists of a mortared stone masonry structure with an upstream earth embankment, and an overflow spillway located near the center of the dam. An earth embankment forms the right end of the dam. The dam has a maximum height of 20 feet, and an overall length of 315 feet. The stone masonry wall has a top width of approximately 6 feet, a downstream batter of 1 horizontal to 6.5 vertical, and an unknown upstream batter. There is an 18-inch wide by 12-inch high concrete wall at the upstream edge of the stone masonry wall. The spillway consists of a concrete cap on the stone masonry wall. The crest length is 22.3 feet and the freeboard from spillway crest to the top of the concrete wall is 1.7 feet. The outlet works consist of a 12-inch supply main from an upstream intake structure or gate chamber to a downstream chemical treatment building. There are high level and low level 16-inch intake sluice gates located on the outside of the upstream wall of the gate chamber. A 30-foot long wooden foot bridge provides access from the dam to the gate chamber.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Small" in size, with a "High" hazard potential. According to the Guidelines, the Test Flood should be in the range of 1/2 the Probable Maximum Flood (1/2 PMF) to the Probable Maximum Flood (PMF). The PMF was selected as the Test Flood. The dam has a watershed of only 0.17 square miles. The inflow was calculated to be 360 cfs and the routed outflow was 335 cfs. The spillway has a capacity of 140 cfs or 42 percent of the routed outflow. The Test Flood routed outflow would overtop the dam by 0.3 feet.

The condition of the dam at the time of inspection was judged to be fair. Conditions that could affect the integrity of the dam are the seepage exiting through the face and downstream of the dam; the erosion of the upstream embankment; the growth of large trees at the toe of the dam; the outlet pipe being controlled by downstream gates instead of upstream sluice gates; and the lack of adequate spillway capacity.

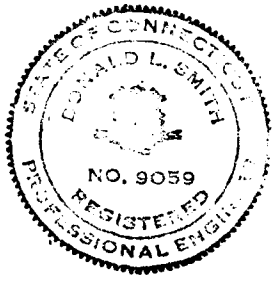
It is recommended that a qualified, registered engineer investigate the seepage and wet areas downstream of the dam and the erosion of the upstream embankment; perform a detailed hydrologic/hydraulic analysis to determine the need for and means to provide additional discharge capacity; and to evaluate the ability of the dam to withstand overtopping if so indicated. The trees at the toe of the dam should be removed and the root zones carefully backfilled with selected soils.

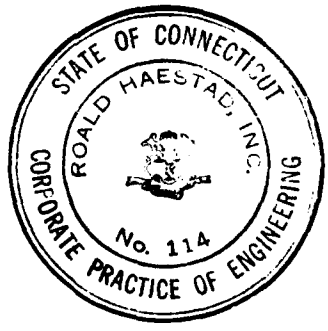
Additionally, the intake sluice gates should be closed, and the foot bridge to the gate chamber repaired. Technical inspections by qualified, registered engineers should be made annually. An operations and maintenance manual should be prepared for the dam and operating facilities, and a formal warning system should be put into effect.

The owner should implement the recommendations as described herein and in greater detail in Section 7 of the Report, within one year after receipt of this Phase I Inspection Report.

Donald L. Smith, P.E.
Project Engineer

Roald Haestad,
President





PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the

condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety of the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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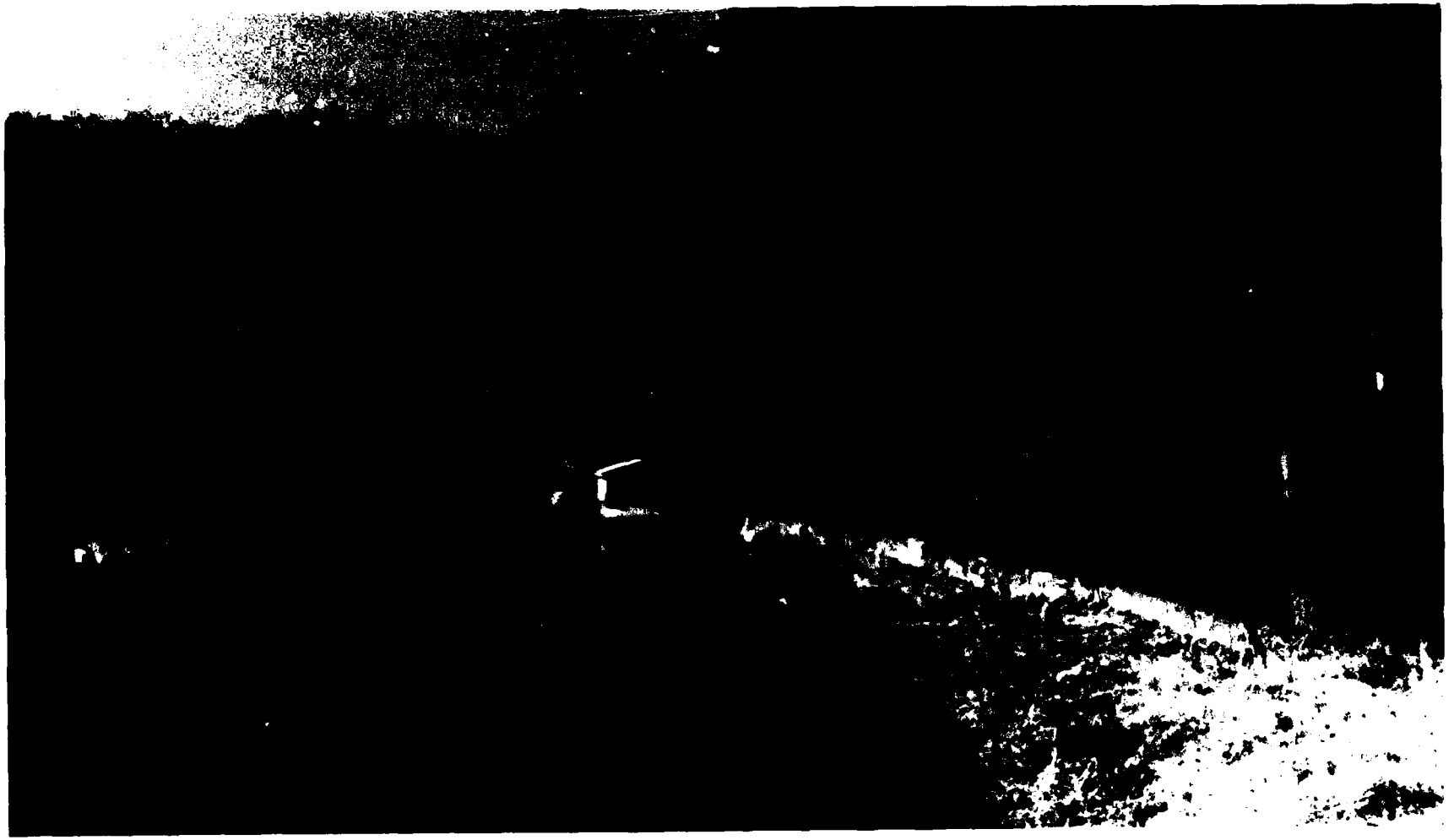
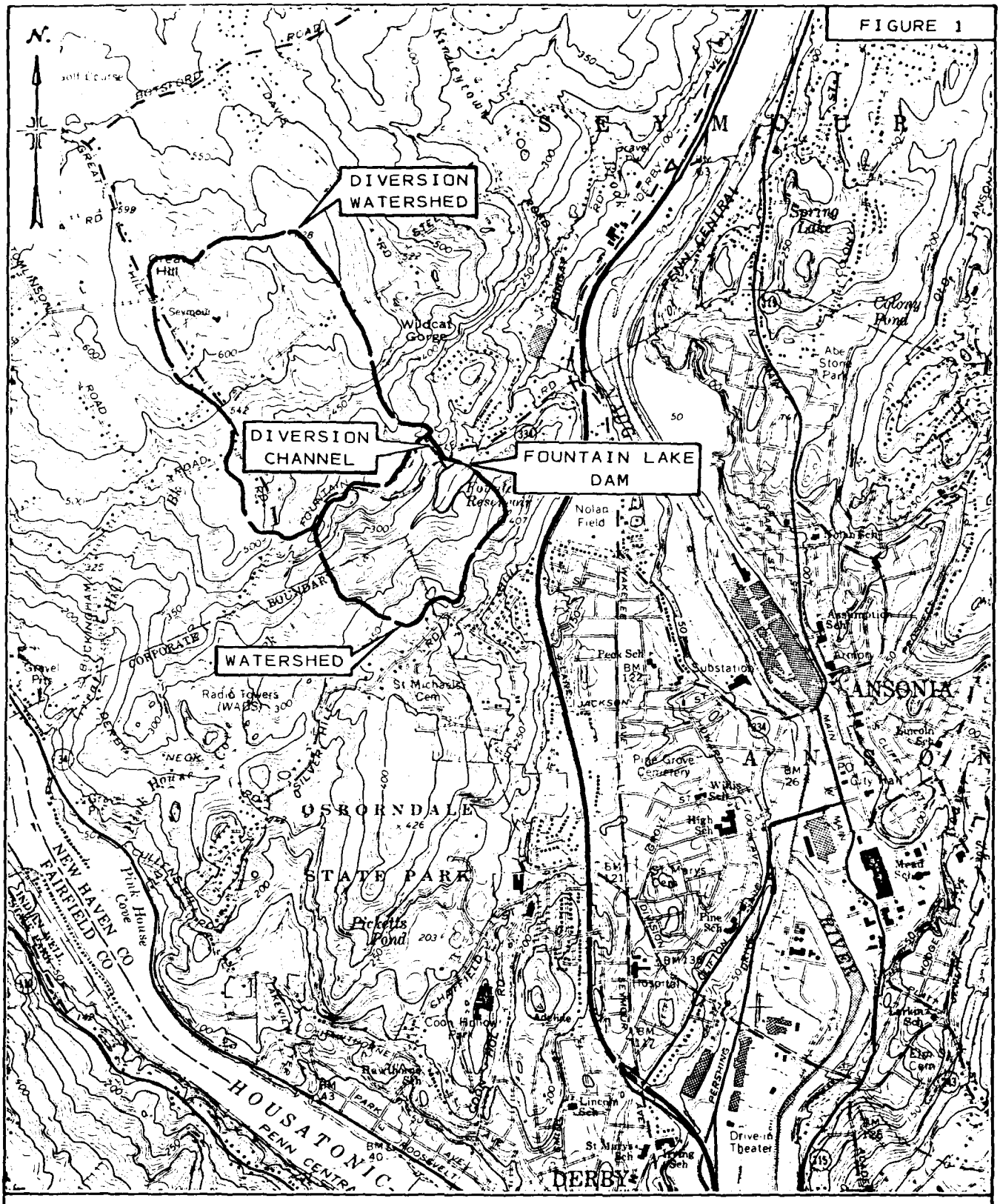


OVERVIEW PHOTO

U.S.ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM - TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CONNECTICUT CT 00025 16 JAN '80

FIGURE 1



LOCATION PLAN

FOUNTAIN LAKE DAM
ANSONIA AND SEYMOUR, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC. ANSONIA QUADRANGLE 1972

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

PROJECT INFORMATION
SECTION 1

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Roald Haestad, Inc., has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Roald Haestad, Inc. under a letter of November 1, 1979, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0015 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interest.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The dam is located immediately south of Connecticut Route 334, on the corporate boundary of Ansonia and Seymour, on an unnamed tributary to the Naugatuck River. The dam is shown on the Ansonia Quadrangle Map having coordinates of latitude N 41° 21.4' and longitude W 73° 06.0'.

b. Description of Dam and Appurtenant Structures

The Fountain Lake Dam consists of a mortared stone masonry structure with an upstream earth embankment, and an overflow spillway located near the center of the dam. There is an earth embankment at the right end of the dam. The presence of the stone masonry wall within the earth embankment at this location is unknown. The dam has a maximum height of 20 feet and an overall length of 315 feet. The stone masonry wall has a top width of approximately 6 feet, a downstream batter of 1 horizontal to 6.5 vertical, and an unknown upstream batter.

There is an 18-inch wide by 12-inch high concrete wall at the upstream edge of the stone masonry wall. The concrete wall appears to extend into the abutments at each end of the dam. A nine foot long section of the wall is missing near the right end of the dam.

The top width of the upstream earth embankment varies from a maximum width of 10 feet near the left end of the dam to no embankment at all for a 30 foot long section of the dam to the right end of the spillway.

The spillway consists of a concrete cap on the stone masonry wall. The crest length is 22.3 feet and the freeboard from spillway crest to the top of the concrete wall is 1.7 feet. The outlet works consist of a 12-inch supply main from an upstream intake structure or gate chamber to a downstream chemical treatment building. There are high level and low level 16-inch intake sluice gates located on the outside of the upstream wall of the gate chamber. Screens are reported to be located in the gate chamber. A 30 foot long wooden foot bridge provides access from the dam to the gate chamber. A 6-inch blowoff line connected to the 12-inch supply main approximately 110 feet downstream of the dam discharges to the brook below the dam. Records indicate that an old 8-inch connection to another reservoir passes through the dam and has been filled with grout.

A small wood enclosure located at the top of the dam and to the right of the spillway formerly housed some type of instrumentation.

c. Size Classification - "Small"

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Small" in size if the height is between 25 feet and 40 feet, or the dam impounds between 50 Acre-Feet and 1,000 Acre-Feet. The dam has a maximum height of 20 feet and a maximum storage capacity of 72 Acre-Feet. Therefore, the dam is classified as "Small" in size based on storage capacity.

d. Hazard Classification - "High"

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Hazard Classification for the dam is "High". A dam failure analysis indicates that a breach of Fountain

Lake Dam would overtop Connecticut Route 334 located 300 feet downstream of the dam by 6 feet; flood approximately 6 homes located 800 feet downstream of the dam; flood a commercial parking lot located 3,000 feet downstream of the dam to a depth of 2 feet; and flood a low area west of Derby Avenue used for the storage of construction equipment. A breach of the dam could result in the loss of more than a few lives, and the economic losses associated with downstream flooding of homes.

e. Owner

Former Owner: The Fountain Lake Water Company

Present Owner: The Ansonia-Derby Water Company
(Formerly The Ansonia Water Company)
230 Beaver Street
Ansonia, Connecticut 06401
(203) 735-1888

f. Operator

Mr. Frederick Elliot, Superintendent
The Ansonia-Derby Water Company
230 Beaver Street
Ansonia, Connecticut 06401
(203) 735-1888

g. Purpose of the Dam

The dam impounds Fountain Lake, a reservoir for public water supply for the Ansonia-Derby Water Company. Water has not been drawn from the reservoir for the past 3-1/2 years.

h. Design and Construction History

There is no information available on the design or construction of the dam. In 1946, the downstream face and toe of the dam were grouted.

i. Normal Operational Procedures

Daily records of the Lake level are maintained. As the reservoir is currently not in use, there are no operational procedures for the dam.

1.3 Pertinent Data

a) Drainage Area

The drainage area consists of 0.17 square miles of rolling, wooded terrain with no development. Another 0.41 square miles of drainage area is tributary via a diversion channel controlled by a 12-inch gate valve. The capacity of the diversion is approximately 6 cfs.

b. Discharge at Damsite

The discharge at the damsite is over a 22.3 foot long overflow spillway. The outlet works consists of a 12-inch supply main from an upstream intake structure to a downstream chemical treatment plant. A 6-inch blowoff line connected to the 12-inch supply main discharges to the downstream channel.

1.	Outlet Works (conduits) Size:	12-inch supply main
	Invert Elevation:	222 (approximate)
	Discharge Capacity:	6 cfs*
2.	Maximum Known Flood at Damsite:	Unknown
3.	Ungated Spillway Capacity at Top of Dam:	138 cfs
	Elevation:	238
4.	Ungated Spillway Capacity at Test Flood Elevation:	180 cfs
	Elevation:	238.3
5.	Gated Spillway Capacity at Normal Pool Elevation:	N/A
	Elevation:	
6.	Gated Spillway Capacity at Test Flood Elevation:	N/A
	Elevation:	
7.	Total Spillway Capacity at Test Flood Elevation:	180 cfs
	Elevation:	238.3
8.	Total Project Discharge at Top of Dam:	138 cfs
	Elevation:	238
9.	Total Project Discharge at Test Flood Elevation:	335 cfs
	Elevation:	238.3

*Capacity of 6-inch blowoff connected to 12-inch supply main.

c. Elevation - Feet Above Mean Sea Level (NGVD)

1.	Streambed at Toe of Dam:	218
2.	Bottom of Cutoff:	Unknown
3.	Maximum Tailwater:	N/A
4.	Recreation Pool:	N/A
5.	Full Flood Control Pool:	N/A
6.	Spillway Crest:	236.3
7.	Design Surcharge - Original Design:	Unknown
8.	Top of Dam:	238
9.	Test Flood Surcharge:	238.3

d. Reservoir - Length in Feet

1.	Normal Pool:	800 ft.
2.	Flood Control Pool:	N/A
3.	Spillway Crest Pool:	800 ft.
4.	Top of Dam:	900 ft.
5.	Test Flood Pool:	900 ft.

e. Storage - Acre-feet

1.	Normal Pool:	63 Ac.-Ft.
2.	Flood Control Pool:	N/A
3.	Spillway Crest Pool:	63 Ac.-Ft.
4.	Top of Dam:	72 Ac.-Ft.
5.	Test Flood Pool:	74 Ac.-Ft.

f. Reservoir Surface - Acres

1.	Normal Pool:	5.5 Acres
2.	Flood-Control Pool:	N/A
3.	Spillway Crest:	5.5 Acres
4.	Test Flood Pool:	5.5 Acres
5.	Top of Dam:	5.5 Acres

g. Dam

1.	Type:	Mortared stone masonry with upstream earth embankment
2.	Length:	315 ft.
3.	Height:	20 ft.
4.	Top Width:	6 ft.
5.	Side Slopes:	Downstream - Stone Masonry 1 Horizontal to 6.5 Vertical Upstream - Earth Embankment 2 Horizontal to 1 Vertical
6.	Zoning:	N/A
7.	Impervious Core:	N/A
8.	Cutoff:	Unknown
9.	Grout Curtain:	Unknown
10.	Other:	Earth embankment Right side of dam

h. Diversion and Regulating Tunnel N/A

i. Spillway

1. Type:	Concrete cap with a vertical stone face on the downstream side
2. Length of Weir:	22.3 ft.
3. Crest Elevation with Flashboards: without Flashboards:	 N/A 236.3
4. Gates:	N/A
5. Upstream Channel:	Reservoir
6. Downstream Channel:	Sinuous Stream
7. General:	1.7 feet of freeboard from spillway crest to top of dam

j. Regulating Outlets

1. Invert:	222 (Approximate)
2. Size:	12-inch
3. Description:	Supply Main
4. Control Mechanism:	2 - 16-inch x 16-inch manually operated sluice gates at intake. High and low level inlets. Normally controlled by downstream valves.
5. Other:	A 6-inch blowoff is connected to the 12-inch supply main.

ENGINEERING DATA
SECTION 2

2.1 Design Data

There was no design data available for review. The only information available on the dam consisted of a contour map of the impoundment dated 1929, a plan prepared by The Penetryn System, Inc. dated June 26, 1946 showing proposed repairs to the dam, and a sketch showing the outlet works piping.

2.2 Construction Data

There was no information available for review on the original construction of the dam. The owner reported that the repair work shown on the 1946 Penetryn plan was not completed on the right side of the dam. The plan calls for "guniting" the top of the dam, repointing the stone masonry joints, and grouting of the downstream face and base of the wall.

2.3 Operation Data

The water level in the Lake is recorded daily. Levels above spillway are recorded only as "Running Over".

2.4 Evaluation of Data

a. Availability

Existing data was provided by the Ansonia-Derby Water Company. Original design plans were lost during the August 1955 Flood. A list of available reference material is given in Appendix B.

b. Adequacy

The information that was available along with the visual inspection, past performance history, and hydraulic and hydrologic calculations were adequate to assess the condition of the facility.

c. Validity

The visual inspection and field surveys indicate that the repairs shown on the 1946 Penetryn plan were not completed. The downstream face of the masonry wall to the left of the spillway appears to have been grouted, as grout pipes are exposed. No grout pipes were visible to the right of the spillway.

VISUAL INSPECTION

SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on December 21, 1969. At the time of the inspection, water was flowing over the spillway. The general condition of the dam at the time of the inspection was fair.

b. Dam

The dam consists of a mortared stone masonry structure, Photos 1 and 2, with an upstream earth embankment and an overflow spillway located near the center of the dam, Photo 3. There is an earth embankment at the right end of the dam, Photo 4. The presence of the stone masonry wall within the embankment at this section of the dam is unknown. An 18-inch wide approximately 12-inch high concrete wall, Photo 4, was observed along the entire length of the dam crest, with the exception of a 9 foot long section near the right end of the dam. It is not known whether this concrete wall on the crest is the top of a core wall or simply a parapet wall to raise the freeboard. The construction of the upstream face of the dam is not known. A varying width of earth embankment was observed upstream of the concrete wall at all locations except for a 30 foot long section immediately to the right of the spillway, Photos 5 and 6, where no earth embankment was observed. It may be that the dam was constructed without an embankment at this section of the dam; however, it is possible that this condition was caused by erosion of the upstream embankment and consequent reduction in crest width. No riprap was

observed on the upstream slope of the earth embankment and erosion was observed at the waterline, Photo 7.

The section of the downstream masonry wall to the right of the spillway was observed to be in good condition. The mortar in the joints was generally tight. However, some seepage through this section of the wall was observed immediately to the right of the spillway, downstream of the area where no earth embankment was observed on the upstream side of the crest. At this location, evidence of seepage in the form of ice, was observed at elevations up to within 3 feet of the crest of the dam, Photo 3.

The section of the downstream masonry wall to the left of the spillway showed evidence of "guniting". The "gunite" was cracked and showed efflorescence in many joints. Grout pipes, 3/4-inch diameter, were also observed protruding from this section of the wall. Evidence of seepage, in the form of ice, was observed in the bottom 5 feet of the wall near the left end, Photo 8. At one location, the rate of seepage from one of the joints was such that ice had not built up. The seeping water appeared to be clear.

Three wet areas were observed downstream of the dam. One wet area approximately 20 feet wide by 35 feet long was observed approximately 30 to 50 feet downstream of the seeps in the base of the left end of the downstream wall. Some of the water in this wet area appeared to originate from clear seepage from the left abutment. A second wet area approximately 10 feet wide by 15 feet long was observed downstream and to the right of the spillway as shown in Figure 2, Appendix B. Seepage with rust staining and an oily sheen was observed in this area. A third wet area consisted of a small stream

flowing in a 15 foot wide gully originating approximately 25 feet to the right of the second wet area described above, Photo 9. The seepage in this gully flowed from the point of origination downstream until it intersected the brook flowing from the spillway. The seepage was rust stained and had an oily sheen. Approximately 25 feet downstream of the section of the dam where the concrete was missing, a 15 foot wide by 20 foot long, 3 to 4 foot deep, dry depression was observed. No explanation of this depression was apparent.

Several pine trees with trunk diameters of approximately 20 inches were observed within approximately 10 feet of the toe of the stone masonry wall on both sides of the spillway, Photos 1 and 2.

c. Appurtenant Structures

The appurtenant structures consist of the spillway and the outlet works. The spillway consists of a concrete cap on the stone masonry portion of the dam. The concrete wall at the left side of the spillway is deteriorated, Photo 10.

The outlet works consists of an intake structure or gate chamber located in the reservoir apparently at the toe of the upstream earth embankment. The concrete is deteriorated and efflorescence is present in some areas, Photo 11. The intake gates appear to be open, with the stems rusted at the waterline. The gates were not operated during the inspection. The owner reported that the gates are operable.

The wooden foot bridge, Photo 4, is in poor condition with many of the deck boards rotted through.

A small wooden enclosure is located at the top of the dam to the right of the spillway, Photo 5. The enclosure formerly housed some type of instrumentation for the dam.

d. Reservoir Area

There were no indications of instability along the edges of the reservoir in the vicinity of the dam.

e. Downstream Channel

The downstream channel consists of a sinuous streambed in a lightly wooded area. Some wood and rock debris were observed in the streambed, particularly at the base of the spillway.

3.2 Evaluation

Based on the results of the visual inspection the dam is judged to be in fair condition. The following conditions could affect the long-term performance of the dam:

a. Continued seepage through the dam could lead to internal erosion of the dam.

b. Continued erosion of the upstream face could lead to further loss of crest width, such as that which may have occurred to the right of the spillway. This loss of crest width could increase the amount of seepage through the dam and lead to internal erosion and/or breach of the dam.

c. The root systems of the large pine trees located near the downstream toe of the dam could provide pathways for seepage and internal erosion.

d. The fact that the intake gates are open means that the supply main through the dam is under constant pressure, any leaks could lead to internal erosion of the dam.

e. The poor condition of the wooden foot bridge does not provide adequate access to the intake structure or gate chamber.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Procedures

a. General

The reservoir is currently not being used. Therefore, there is no formal operational procedures in effect. Water levels are normally recorded daily. The sluice gates at the intake structure or gate chamber are left open. When water is drawn from the reservoir, valves in a downstream chemical treatment plant are opened.

b. Description of Any Warning System In Effect

There is no formal warning system in effect for the dam. The dam is monitored twice a day during heavy rains, and the police would be notified in the event of an emergency.

4.2 Maintenance Procedures

a. General

Normal maintenance procedures for the dam include cutting the brush and grass in the area of the dam.

b. Operating Facilities

The intake structure or gate chamber is reportedly drained and inspected twice a year. At this time the screens within the chamber are also cleaned. The chamber is drained by opening the blowoff that discharges to the downstream channel.

4.3 Evaluation

Present operations and maintenance procedures are inadequate, as is evident by the condition of the service bridge to the gate chamber. An operations and maintenance manual should be prepared for the dam and operating facilities. The warning system now in effect should be formalized and should include monitoring the dam

during heavy rains and procedures for notifying downstream authorities. The dam should be inspected by a qualified, registered engineer every year.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

SECTION 5

5.1 General

The spillway for Fountain Lake Dam is a 22.3 foot long overflow section in the middle of the dam. The spillway consists of a concrete cap and vertical stone masonry downstream face. At the crest of the dam is a concrete wall, 18-inches wide by 12-inches high, poured on the stone masonry dam. The top of the concrete wall is 1.7 feet above spillway level.

The dam has a tributary watershed of only 0.17 square miles. The terrain is "rolling" wooded hills with no development. Another 0.41 square mile watershed is tributary via a diversion channel controlled by a 12-inch gate valve. The capacity of the diversion is about 6 cfs. Overtopping of the diversion will not add significant flood flows to Fountain Lake.

Piping at the dam consists of a 12-inch supply main from an upstream intake structure with two 16-inch sluice gates, to a downstream chemical treatment building. Sketches indicate an old 8-inch line through the dam has been filled with grout. The supply main has a 6-inch blowoff to the stream below the dam. The supply main is also connected to the old 8-inch line below where it was grouted. The blowoff has a capacity of 6 cfs.

5.2 Design Data

No design data on the dam or spillway could be found.

5.3 Experience Data

No records of past flood experience were available.

5.4 Test Flood Analysis

Based on the dam failure analysis, the dam is classified as "High" hazard potential. The size of the dam is "Small", based on a height of 20 feet and storage capacity of 72 Acre-Feet. According to the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers', the Test Flood should be in the range of 1/2 the Probable Maximum Flood (1/2 PMF) to the Probable Maximum Flood (PMF) depending on the involved risk. A Test Flood equal to the PMF was selected because of the extensive development downstream and the potential loss of more than a few lives should the dam fail. The Test Flood was calculated using 2,125 cubic feet per second per square mile (csm), from the minimum 2 square mile drainage area shown on the guide curves supplied by the Corps of Engineers, and the 0.17 square mile watershed of Fountain Lake Dam. The peak inflow was calculated to be 360 cfs and the routed outflow 335 cfs. The capacity of the diversion was not included in the calculations. The flood routing through the reservoir was done in accordance with "Estimating Effect of Surcharge Storage on Maximum Probable Discharges" provided by the Corps of Engineers.

The spillway capacity was calculated to be 140 cfs or 42% of the Test Flood routed outflow. The Test Flood would overtop the dam by 0.3 feet.

The spillway capacity of this dam appears to be inadequate and overtopping could occur in the future. The construction of the dam may allow for some overtopping without failure of the structure.

An investigation should be made to determine the need for and means to provide additional project discharge capacity.

5.5 Dam Failure Analysis

A dam failure analysis was made using the "Rule of Thumb" guidance provided by the Corps of Engineers. Failure was assumed when the water level reached the top of the dam.

The dam breach would release up to 10,500 cfs into the stream below the dam. The flood wave would travel 300 feet downstream where it would overtop Connecticut Route 334 by 6 feet. The flow would divide at this point with some of the water crossing the road and continuing down the brook and the remainder flowing down Route 334. A portion of this water would flow between the houses on the left side of Route 334 and rejoin the flow in the brook. The rest of the water would continue down the highway and eventually reach the Naugatuck River. The flow in the brook would continue downstream until reaching the shopping plaza where flooding of the parking lot would occur because the culvert does not have the needed capacity. The flood waters in excess of the highway culvert capacity would flow across the parking lot and down to a low area on the west side of Derby Avenue. This area is currently used for storage of construction equipment. The flood waters would pond in the low area and eventually run out to the Naugatuck River through existing culverts.

The maximum spillway capacity, prior to dam breach, of 140 cfs does not exceed the capacity of the downstream culverts. The depth of flow, at the culverts, prior to dam breach is 7.6 feet at Route 334, 6.3 feet at Ansmor Road, 5.7 feet at the shopping plaza and 3 feet at the Derby Avenue-Route 8 culvert. These depths are within

the available freeboard at each culvert. A dam breach will produce flow depths of 6 feet above Route 334, 4.8 feet above Ansmor Road, and 2 to 3 feet at the parking lot of the shopping plaza. The quantity of flow over Route 334 would be 10,200 cfs, 9,300 cfs would flow over Ansmor Road, and 6,500 cfs over the shopping plaza parking lot.

The dam is classified as "High" hazard potential. A dam failure could result in the loss of more than a few lives, and economic loss due to downstream flooding of homes.

EVALUATION OF STRUCTURAL STABILITY

SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any evidences of present structural instability.

The future integrity of the dam could be affected by continued seepage through the dam; continued erosion of the upstream earth embankment; possible development of internal erosion along root systems of trees; possible damage to the structure resulting from uprooting of large trees; and possible leakage from the supply main kept under constant pressure.

6.2 Design and Construction Data

No original design or construction data are available for the dam. Available information on the dam consists of a contour map of the impoundment dated 1929; a drawing prepared by The Penetryn System, Inc. dated June 26, 1946, showing proposed repairs to the dam; and sketches of the outlet work piping. The owner reports that the repairs shown on the 1946 plan were only partially completed.

6.3 Post-Construction History

With the exception of the repairs to the dam in 1946, no known changes have been made since the construction of the dam.

6.4 Seismic Stability

The dam is located in Seismic Zone I and in accordance with the recommended Phase I Inspection Guidelines, does not warrant seismic stability analysis.

ASSESSMENT, RECOMMENDATIONS, & REMEDIAL MEASURES
SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection the dam is judged to be in fair condition. An evaluation of the hydraulic and hydrologic features of the dam determined that the spillway is capable of passing 42 percent of the Test Flood. The dam would be overtopped by 0.3 feet as a result of the Test Flood. The future integrity of the dam could be affected by the following:

1. Continued seepage through the dam and the possible development of internal erosion.
2. Continued erosion of the upstream earth embankment and consequent loss of crest width.
3. The possible development of internal erosion along the root systems of the large pine trees near the downstream toe of the dam. Possible damage to the dam as a result of uprooting of these trees during a storm.
4. Overtopping of the dam due to inadequate spillway capacity.
5. Possible leakage and the development of internal erosion due to supply main being kept under constant pressure.

b. Adequacy of Information

There was no design or construction information available other than the plan for the repairs to the dam dated 1946. Thus, the assessment of the condition of the dam is based solely on the visual inspection, past performance history and the hydraulic and hydrologic calculations performed for this Report.

c. Urgency

The recommendations presented in Sections 7.2 and 7.3 of this Report should be carried out by the owner within one year of receipt of this Report.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified, registered engineer:

1. The seepage and wet areas downstream of the dam should be investigated and seepage control systems designed and constructed, as required.
2. The erosion of the upstream face of the dam should be investigated and repairs and restoration of the upstream face, including appropriate erosion protection, should be designed and constructed.
3. The trees and their roots located within 50 feet of the downstream toe of the dam should be removed, and the root zone should be carefully backfilled with selected soil, placed as directed by the engineer.
4. A detailed hydraulic and hydrologic analysis should be performed to determine the need for and means to provide additional project discharge capacity.
5. The ability of the non-overflow section of the dam to withstand overtopping should be investigated if the analysis performed under No. 4, above, indicates overtopping will take place. Special consideration should be given to the section near the right end of the dam where the concrete wall is missing.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. The intake sluice gates should be closed when not in use so that the pipeline through the dam is not under constant pressure.
2. The foot bridge to the gate chamber should be repaired to assure access to the gate operators.
3. The deteriorated concrete on the gate chambers and at the left side of the spillway should be repaired.
4. The reservoir level and the volume of seepage through the dam should be measured periodically. A substantial increase or decrease in flow, unrelated to reservoir level, could indicate a potential problem. Monitoring should be done at least monthly for a period of two years and then the monitoring program should be adjusted after the recommendations outlined in Section 7.2 have been carried out.
5. A program of annual inspections by a qualified, registered engineer should be instituted.
6. A formal operations and maintenance manual for the dam and operating facilities should be prepared. Included in the manual should be procedures for drawing down the Lake in case of an emergency utilizing the 12-inch supply main.
7. A formal warning system should be put into effect and should include monitoring the dam during extremely heavy rains and procedures for notifying downstream authorities in the event of an emergency.

7.4 Alternatives

The only practical alternative to the above recommendations is to breach the dam.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT: Fountain Lake Dam

DATE: 12/21/79 TIME: 9:00 a.m. WEATHER: Cloudy - 30°

W.S. ELEVATION: 236.4 U.S. N/A DN.S

	PARTY	DISCIPLINE
1.	Donald L. Smith, P.E. - Roald Baestad, Inc.	Civil/Hydrologist
2.	Ronald G. Litke, P.E. - Roald Haestad, Inc.	Civil Engineer
3.	Richard Murdoch, P.E. - Geotechnical Engineers, Inc.	Geotechnical Engineer
4.	John W. France, P.E. - Geotechnical Engineers, Inc.	Geotechnical Engineer
5.		
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	RM, JWF	Erosion upstream, large trees downstream of toe.
2.	Outlet Works - Intake Structure & Channel	RM, JWF RGL, DLS	Channel under water. Structure is control tower or gate chamber.
3.	Outlet Works - Control Tower or Gate Chamber	RGL, DLS	Deteriorated concrete, gates appear to be open.
4.	Outlet Works - Outlet Structure & Channel	RM, JWF RGL,DLS	No outlet channel or structure.
5.	Outlet Works - Spill. Weir, App. & Disch, Channel	RM, JWF RGL, DLS	Good condition, some rock and debris in discharge channel.
6.	Outlet Works - Service Bridge	RGL, DLS	Poor - needs repair or replacement.
7.			
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT: Fountain Lake Dam DATE: 12/21/79

PROJECT FEATURE: Dam Embankment NAME: RM

DISCIPLINE: Geotechnical Engineer NAME: JWF

AREA ELEVATION	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	238
CURRENT POOL ELEVATION	236.4
MAXIMUM IMPOUNDMENT TO DATE	Unknown
SURFACE CRACKS	None observed
PAVEMENT CONDITION	None observed
MOVEMENT OR SETTLEMENT OF CREST	None observed
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Good
HORIZONTAL ALIGNMENT	Good
CONDITION AT ABUTMENT AND AT CONCRETE STRUCTURES	Good
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	N/A
TRESPASSING ON SLOPES	None observed
VEGETATION ON SLOPES	Several large (20-in. dia.) pines located within 10' of downstream toe of dam
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Erosion of upstream slope including significant loss of crest width to the right of the spillway.
ROCK SLOPE PROTECTION - RIPRAP FAILURES	No riprap protection observed
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
EMBANKMENT OR DOWNSTREAM SEEPAGE	Seepage exiting downstream masonry wall to the right of spillway and at base of left end. Three wet areas downstream of dam.
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known or observed
TOE DRAINS	None known or observed
INSTRUMENTATION SYSTEM	None known or observed

OTHER: Depression at toe of embankment near right end of dam. Section of concrete wall missing at this location.

PERIODIC INSPECTION CHECK LIST

PROJECT: Fountain Lake Dam DATE: 12/21/79

PROJECT FEATURE: Outlet Works - Intake Channel and Structure NAME: RM, JWF

DISCIPLINE: Geotechnical/Civil NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	Under water and not observable
SLOPE CONDITIONS	
BOTTOM CONDITIONS	
ROCK SLIDES OR FALLS	
LOG BOOM	None
DEBRIS	None
CONDITION OF CONCRETE LINING	N/A
DRAINS OR WEEP HOLES	
B. INTAKE STRUCTURE:	Intake structure is Control Tower. (Gate Chamber)
CONDITION OF CONCRETE	Fair
STOP LOGS AND SLOTS	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Fountain Lake Dam DATE: 12/21/79

PROJECT FEATURE: Outlet Works - (Gate Chamber) Control Tower NAME: EGL

DISCIPLINE: Civil Engineer NAME: DLS

AREA EVALUATED		CONDITIONS
OUTLET WORKS - CONTROL TOWER (GATE CHAMBER)		
A.	CONCRETE AND STRUCTURAL:	No building, just chamber
	GENERAL CONDITION	Fair
	CONDITION OF JOINTS	None observed
	SPALLING	Outside of chamber spalled
	VISIBLE REINFORCING	None
	RUSTING OR STAINING OF CONCRETE	None
	ANY SEEPAGE OR EFFLORESCENCE	Efflorescence on outside
	JOINT ALIGNMENT	None observed
	UNUSUAL SEEPAGE OR LEAKS IN GATE CHAMBER	Could not be observed - Chamber locked.
	CRACKS	No major cracks
	RUSTING OR CORROSION OF STEEL	Gate stems rusted at water line.
B.	MECHANICAL AND ELECTRICAL:	None
	AIR VENTS	N/A
	FLOAT WELLS	N/A
	CRANE HOIST	N/A
	ELEVATOR	N/A
	HYDRAULIC SYSTEM	N/A
	SERVICE GATES	Two intake gates on outside of gate chamber appear to be open, and not to have been used in several years.
	EMERGENCY GATES	N/A
	LIGHTNING PROTECTION SYSTEM	N/A
	EMERGENCY POWER SYSTEM	N/A
	WIRING AND LIGHTING SYSTEM IN GATE CHAMBER	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT: Fountain Lake Dam DATE: 12/21/79

PROJECT FEATURE: Outlet Works - Outlet Structure and Channel NAME: RM,JWF

DISCIPLINE: Geotechnical/Civil NAME: RGL,DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	No outlet channel or structure - Underground pipe to downstream treatment building and outlet in stream.
GENERAL CONDITION OF CONCRETE	
RUST OR STAINING	
SPALLING	
EROSION OR CAVITATION	
VISIBLE REINFORCING	
ANY SEEPAGE OR EFFLORESCENCE	
CONDITION AT JOINTS	
DRAIN HOLES	
CHANNEL	
LOOSE ROCK OR TREES OVERHANGING CHANNEL	
CONDITION OF DISCHARGE CHANNEL	

PERIODIC INSPECTION CHECK LIST

PROJECT: Fountain Lake Dam DATE: 12/21/79

PROJECT FEATURE: Spillway Weir, Approach Outlet Works - & Discharge Channel NAME: RM,JWF

DISCIPLINE: Geotechnical/Civil NAME: RGL,DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	None observed
TREES OVERHANGING CHANNEL	None observed
FLOOR OF APPROACH CHANNEL	Under water and not observable
B. WEIR AND TRAINING WALLS:	
GENERAL CONDITION OF CONCRETE	Good - Some deterioration of left training walls.
RUST OR STAINING	None observed
SPALLING	Some spalling of left training walls.
ANY VISIBLE REINFORCING	None observed
ANY SEEPAGE OR EFFLORESCENCE	None observed
DRAIN HOLES	None observed
C. DISCHARGE CHANNEL:	
GENERAL CONDITION	Fair
LOOSE ROCK OVERHANGING CHANNEL	None observed
TREES OVERHANGING CHANNEL	None observed
FLOOR OF CHANNEL	Sinuous streambed
OTHER OBSTRUCTIONS	Some rock and wood debris on floor of channel, particularly at base of spillway.

PERIODIC INSPECTION CHECK LIST

PROJECT: Fountain Lake Dam DATE: 12/21/79

PROJECT FEATURE: Outlet Works - Service Bridge NAME: RGL

DISCIPLINE: Civil Engineer NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SERVICE BRIDGE	
A. SUPER STRUCTURE:	
BEARINGS	N/A
ANCHOR BOLTS	N/A
BRIDGE SEAT	N/A
LONGITUDINAL MEMBERS	Rotted wood beams
UNDER SIDE OF DECK	N/A
SECONDARY BRACING	N/A
DECK	Wood deck severely rotted - in need of replacement.
DRAINAGE SYSTEM	N/A
RAILINGS	None
EXPANSION JOINTS	N/A
PAINT	N/A
B. ABUTMENT AND PIERS:	
GENERAL CONDITION OF CONCRETE	Efflorescence, spalling & deterioration of concrete of gate chamber & piers.
ALIGNMENT OF ABUTMENT	Good
APPROACH TO BRIDGE	Good
CONDITION OF SEAT AND BACKWALL	N/A

APPENDIX B

ENGINEERING DATA

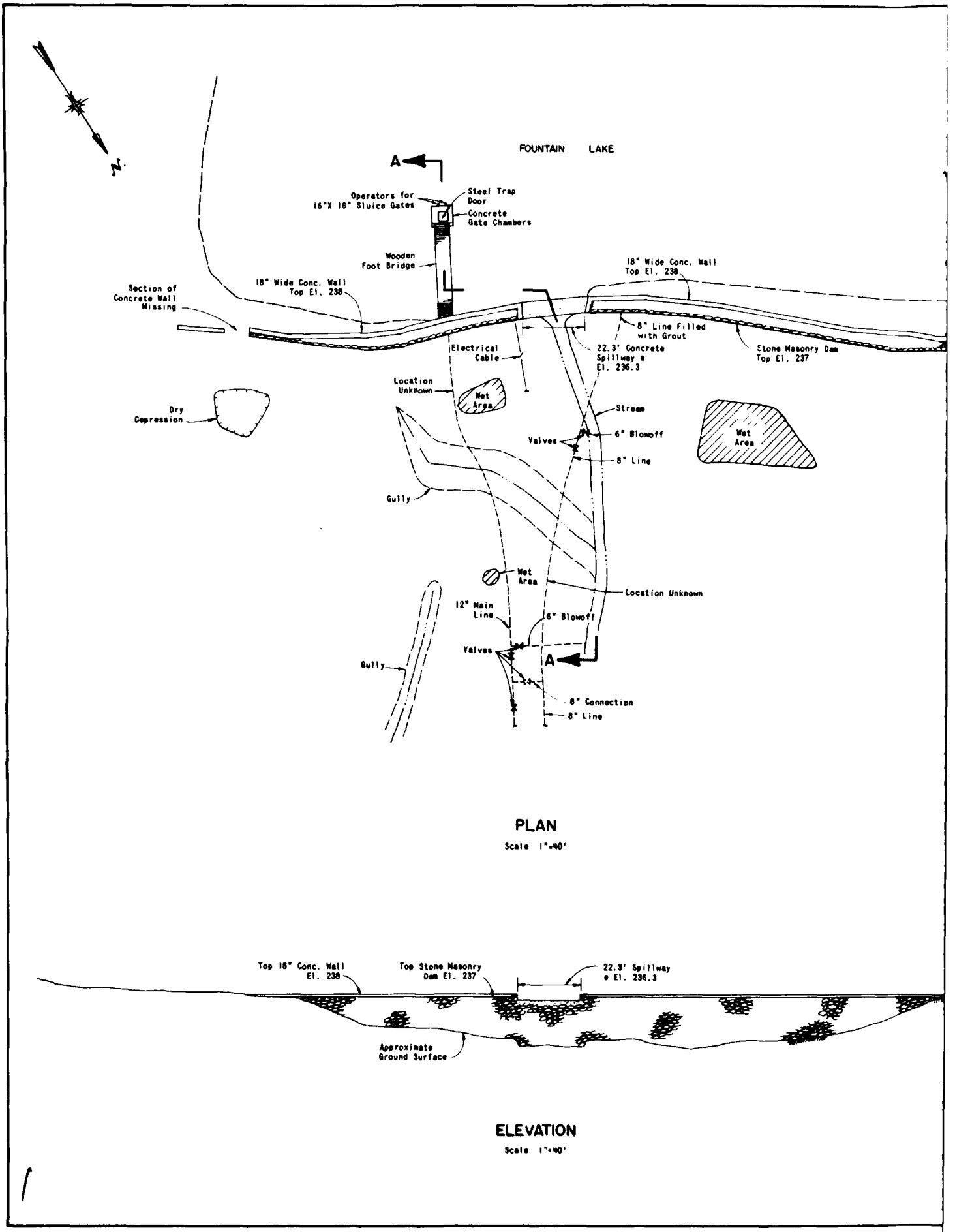
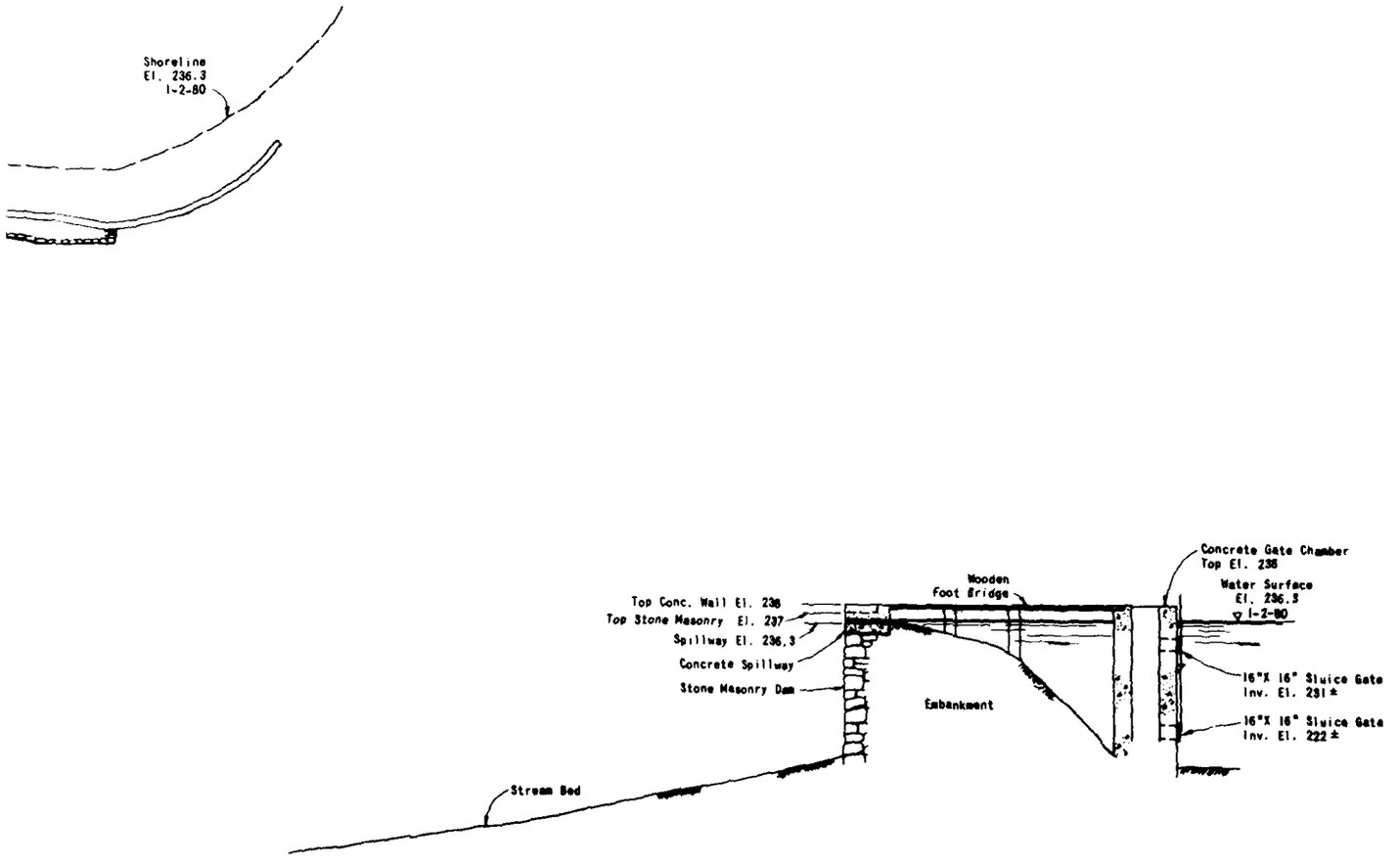

N
FOUNTAIN LAKE
A
Operators for 16"X 16" Sluice Gates
Steel Trap Door
Concrete Gate Chambers
Wooden Foot Bridge
18" Wide Conc. Wall Top El. 238
Section of Concrete Wall Missing
18" Wide Conc. Wall Top El. 238
8" Line Filled with Grout
Electrical Cable
22.3' Concrete Spillway ℄ El. 236.3
Stone Masonry Dam Top El. 237
Location Unknown
Wet Area
Dry Depression
Stream
Valves
6" Blowoff
Wet Area
8" Line
Gully
Wet Area
Location Unknown
12" Main Line
6" Blowoff
Valves
Gully
A
8" Connection
8" Line
PLAN
Scale 1"=40'
Top 18" Conc. Wall El. 238
Top Stone Masonry Dam El. 237
22.3' Spillway ℄ El. 236.3
Approximate Ground Surface
ELEVATION
Scale 1"=40'

FIGURE 2



SECTION A-A

Scale 1"=20'

ROALD HAESTAD, INC *CONSULTING ENGINEERS* WATERBURY, CONNECTICUT	U S ARMY ENGINEER DIV NEW ENGLAND *CORPS OF ENGINEERS* WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

FOUNTAIN LAKE DAM

DRAWN	CHECKED	APPROVED	SCALES AS NOTED	
JRS	DLS		DATE FEB 1980	PAGE B-1

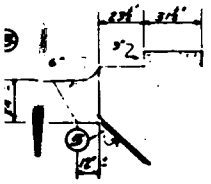
LIST OF REFERENCES

The following references are available at the Ansonia-Derby Water Company, 230 Beaver Street, Ansonia, Connecticut.

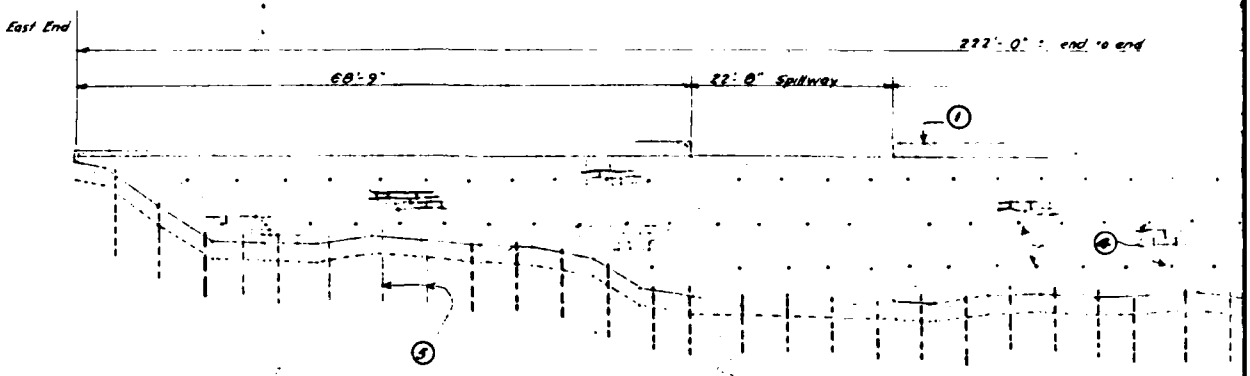
1. The Ansonia Water Company, Contour Map of Fountain Reservoir, Towns of Ansonia and Seymour, Connecticut, Scale: 1" = 40', 1929.

2. "Proposed Repairs to Fountain Lake Dam, Ansonia, Connecticut, For Ansonia Water Company", by The Penetryn Systems, Inc., Albany, Cleveland, Chicago, June 26, 1946.

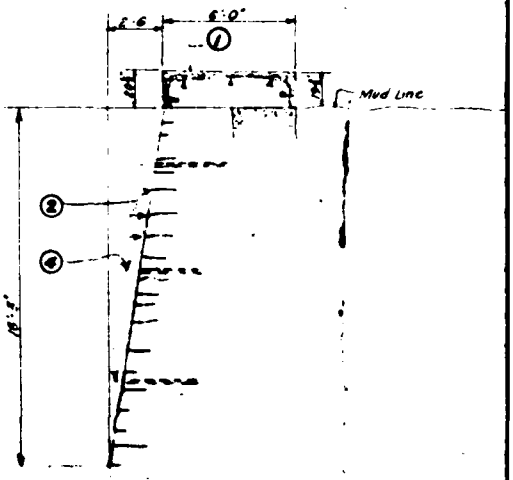
3. Sketches of Outlet Works Piping.



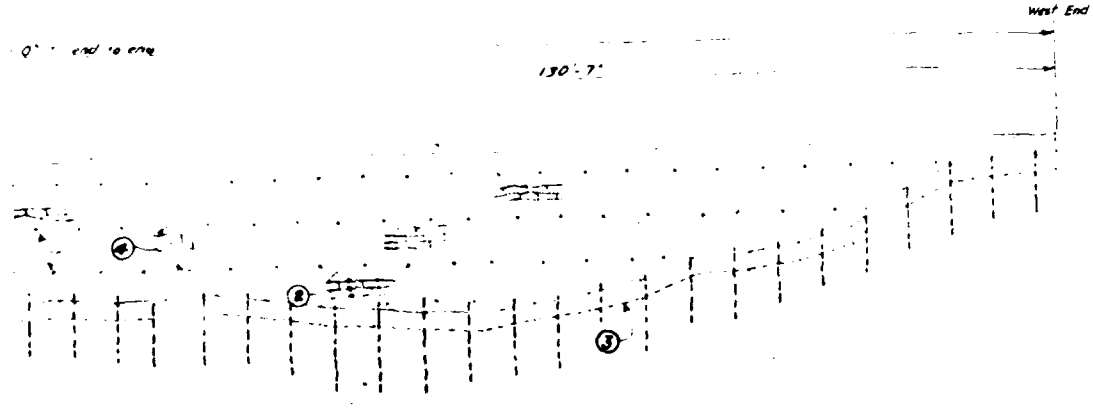
SECT AT EAST END
(Scale ½"=1'-0")

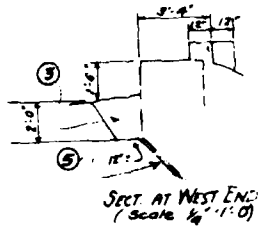


DOWNSTREAM ELEVATION
(Scale 1"=10'-0")



SECTION AT SPILLWAY
(Scale ½"=1'-0")





SECT. AT WEST END
(Scale 1/4" = 1'-0")

ELEVATION

Mud Line

1. Remove all disintegrated concrete and replace with gunite reinforced with wire mesh.
2. Re point all joints in present stone masonry.
3. Excavate to provide access to face of wall for 2'-0" below ground line.
4. Drill grout holes spaced about every 25" over face of wall.
5. Drill grout holes diagonally into base of wall spaced 5'-0" c.c.
6. Permeate with pressure grout all holes directed at 4 & 5.

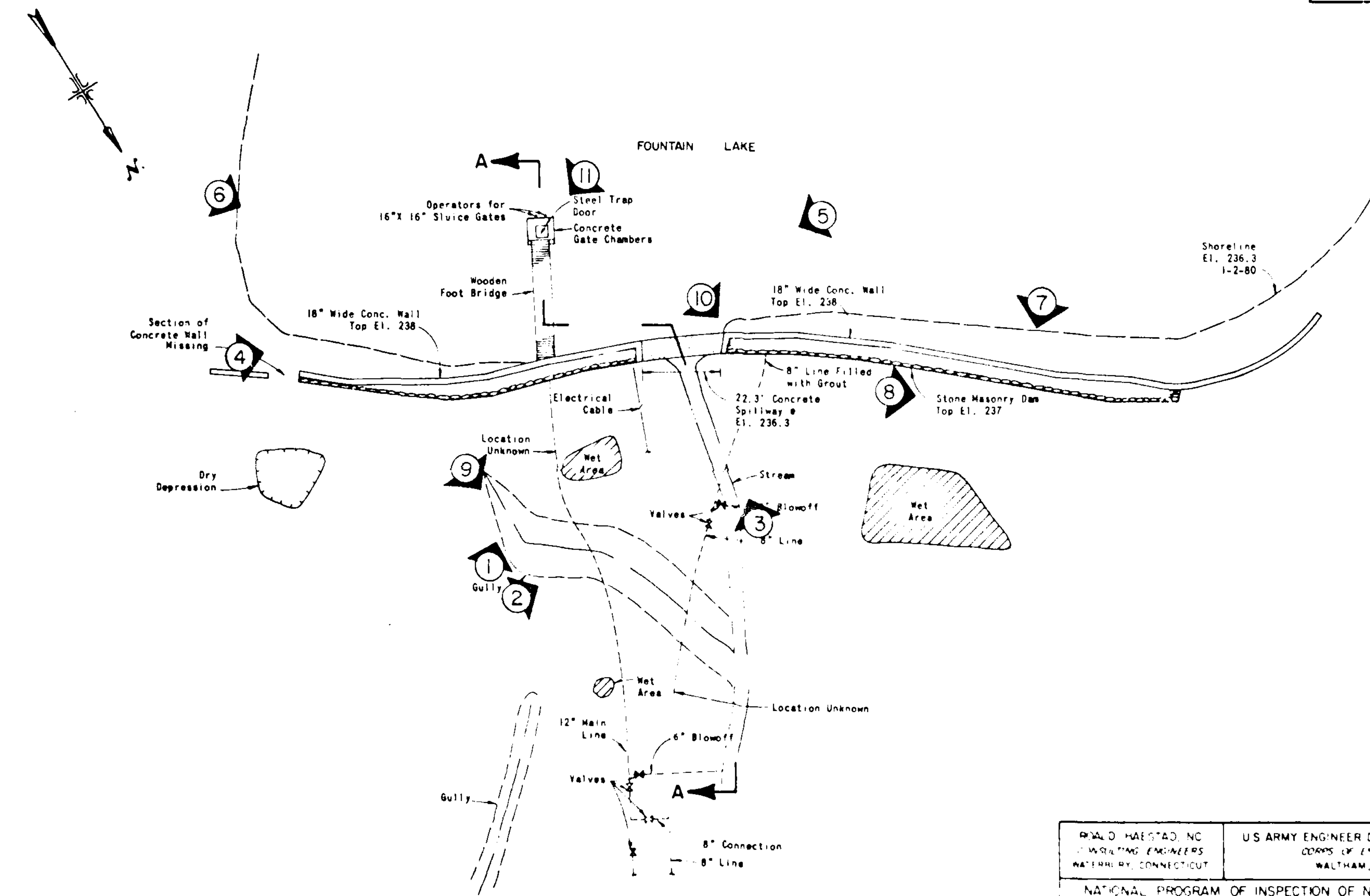
PROPOSED REPAIRS TO
FOUNTAIN LAKE DAM, ANSONIA, CONN.
FOR ANSONIA WATER CO.
BY THE PENETRYN SYSTEMS, INC.
Albany Cleveland Chicago

June 20 1963

APPENDIX C

PHOTOGRAPHS

FIGURE 2



Denotes Photo Number and Direction in which Photo was Taken

RONALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

PHOTO LOCATION PLAN

FOUNTAIN LAKE DAM

ANSONIA AND SEYMOUR, CONNECTICUT

DRAWN	CHECKED	APPROVED	SCALE 1" = 40'
			DATE FEB. 1980 / PAGE C-1

PHOTO NO. 1

DOWNSTREAM MASONRY WALL RIGHT OF SPILLWAY.
NOTE PINE TREES DOWNSTREAM OF DAM.

PHOTO NO. 2

DOWNSTREAM MASONRY WALL.
NOTE SPILLWAY, AND PINE TREES DOWNSTREAM OF DAM

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CT. CT 00025 16 JAN '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 3

SPILLWAY FROM DOWNSTREAM.
NOTE SEEPAGE INDICATED BY ICE TO
THE RIGHT OF THE SPILLWAY (LEFT IN PHOTO)

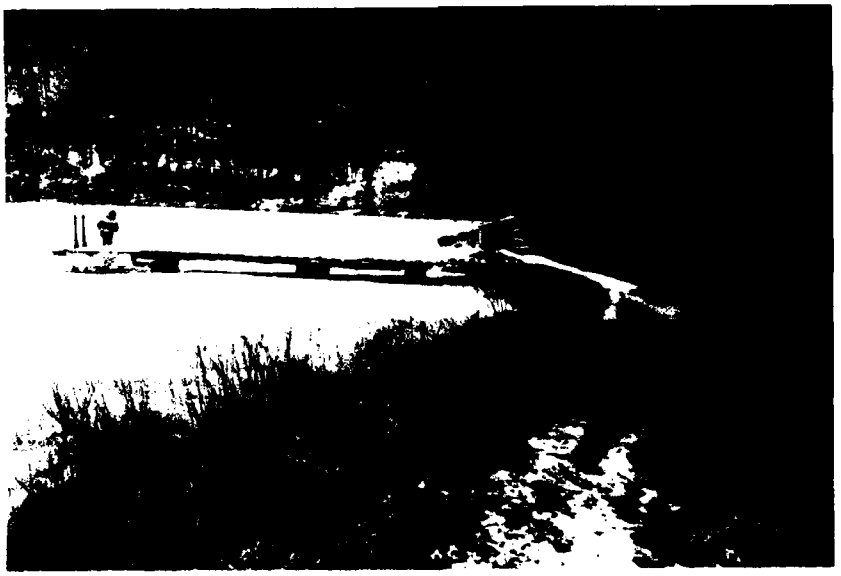


PHOTO NO. 4

CREST OF DAM FROM RIGHT ABUTMENT.
NOTE CONCRETE WALL.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CT. CT 00025 21 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

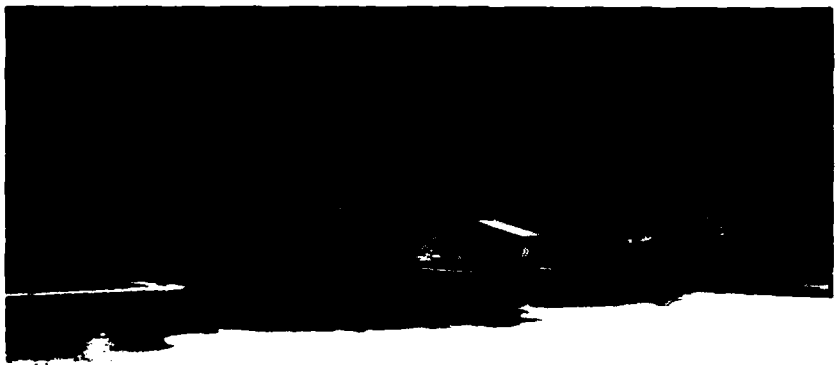


PHOTO NO. 5

UPSTREAM FACE OF DAM.
NOTE LACK OF EMBANKMENT UPSTREAM OF
CONCRETE WALL TO THE RIGHT OF THE SPILLWAY.

PHOTO NO. 6*

UPSTREAM FACE OF DAM.
NOTE INTAKE STRUCTURE AND SERVICE BRIDGE.

*16 JAN '80

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CT. CT 00025 21 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 7

UPSTREAM FACE OF DAM AT WATERLINE. NOTE EROSION OF EARTH EMBANKMENT.

PHOTO NO. 8

SEEPAGE FROM DOWNSTREAM MASONRY WALL LEFT OF SPILLWAY INDICATED BY ICE

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CT. CT 00025 21 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

SEEPAGE FLOWING IN 15 FT. WIDE
GULLY DOWNSTREAM OF THE DAM.

PHOTO NO. 10

DETERIORATION OF CONCRETE WALL
AT LEFT SIDE OF SPILLWAY.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CT. CT 00025 21 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

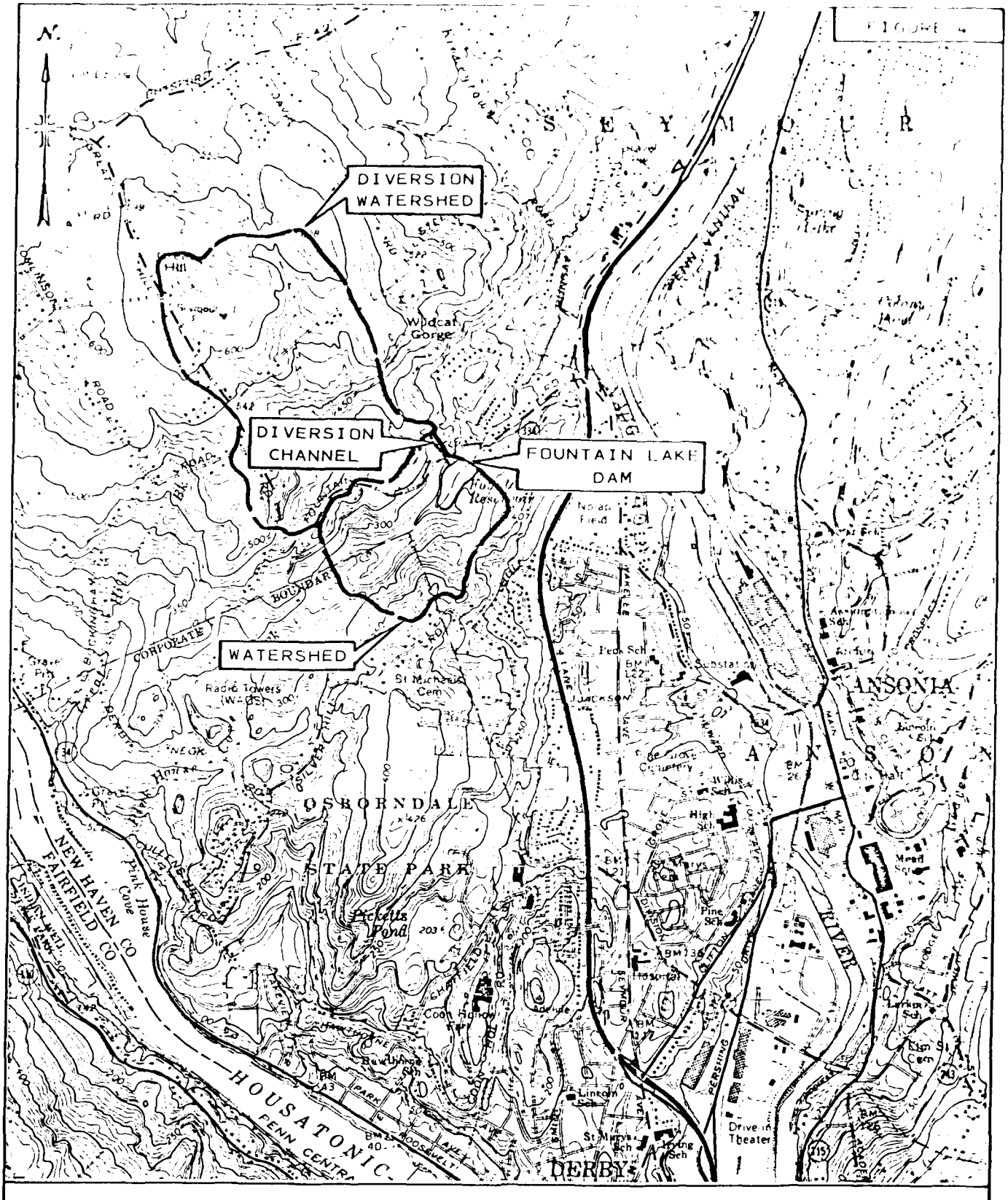
PHOTO NO. 11

INTAKE GATE CHAMBER.
NOTE EFFLORESCENCE AND DETERIORATION OF CONCRETE.

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	FOUNTAIN LAKE DAM TR. TO NAUGATUCK RIVER ANSONIA/SEYMOUR, CT. CT 00025 21 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



WATERSHED MAP

FOUNTAIN LAKE DAM
ANSONIA AND SEYMOUR, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC. ANSONIA QUADRANGLE 1972

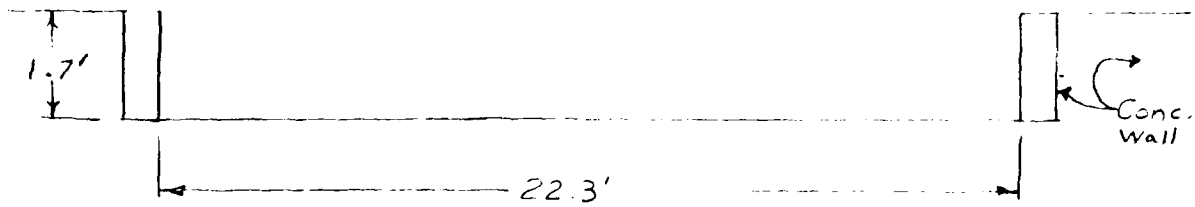
BY ..... DATE ..... **ROALD HAESTAD, INC.** SHEET NO. 1 OF 12

CKD BY DLS DATE 11/30/80 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-13

SUBJECT FOUNTAIN LAKE DAM - Spillway Capacity

Spillway Elev. = 236.3
Spillway Length = 22.3 ft
TOP OF DAM ELEV. = 238.0

Coeff @ Spillway = 2.8
Coeff @ Conc. Wall = 2.8



FREEBOARD = 1.7 ft

SPILLWAY CAPACITY = $CLH^{3/2} = 2.8(22.3\text{ ft})(1.7)^{3/2}$

$= 138$ cfs

Average Elevation of top of Dam = 238
Length of Dam Crest @ Elev 238 = 300 ft.

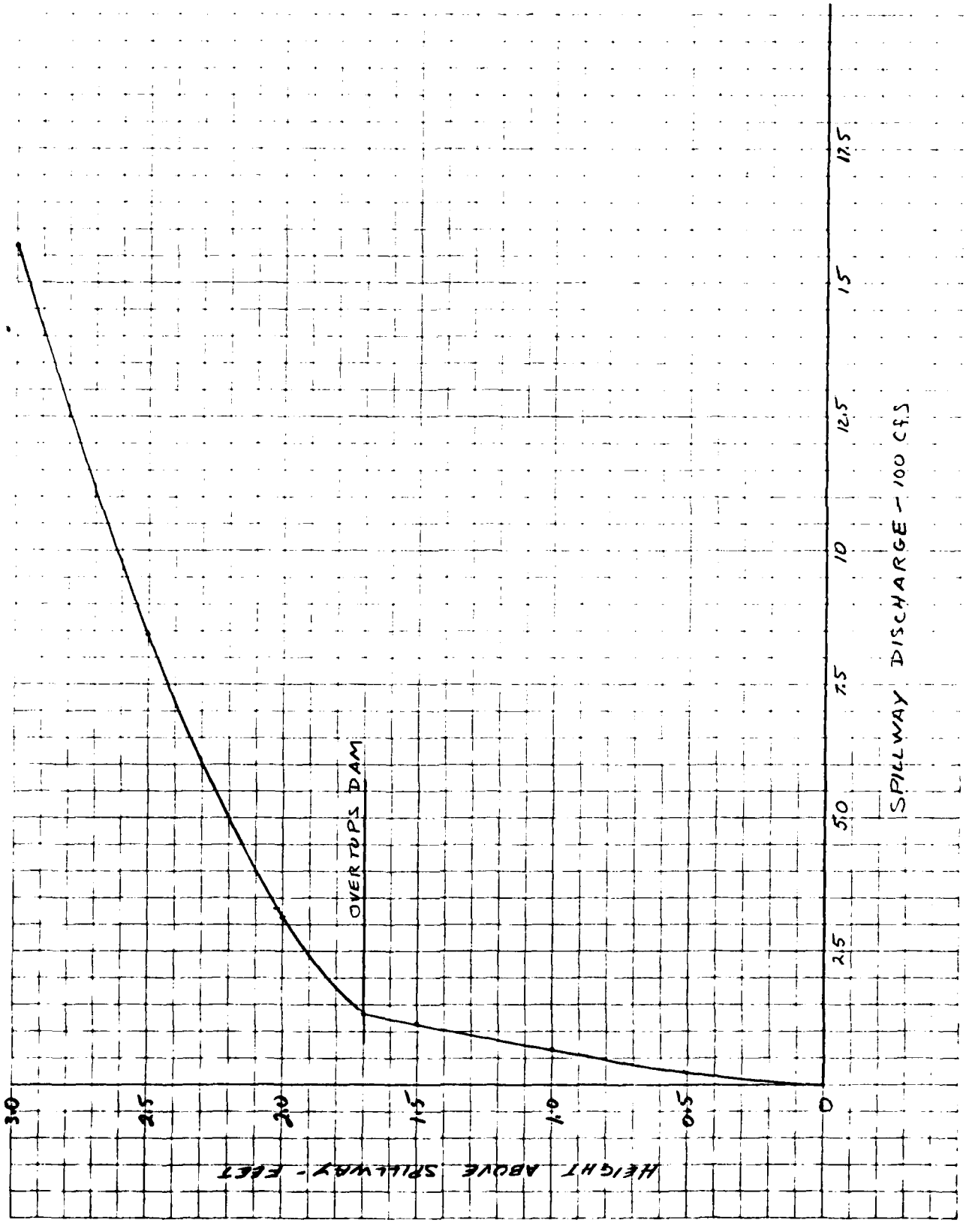
DEPTH OF FLOW (ft)	SPILLWAY	DAM CREST	TOTAL FLOW (CFS)
0.5	22	0	22
1.0	62	0	62
1.5	115	0	115
1.7	138	0	138
2.0	177	138	315
2.5	247	601	848
3.0	324	1245	1569

BY DLS DATE 2/6/80 **ROALD HAESTAD, INC.** SHEET NO 2 OF 12

CONSULTING ENGINEERS

CKD BY SL DATE 2/18/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

SUBJECT FOUNTAIN LAKE DAM - SPILLWAY CAPACITY CURVE



BY SL DATE 1/15/82 **ROALD HAESTAD, INC.** SHEET NO 3 OF 12
CONSULTING ENGINEERS
CKD BY RH DATE 1/30/82 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

SUBJECT MOUNTAIN LAKE DAM: Surcharge Storage

Height Above Spillway (ft)	Surface Area (Acres)	Average Surface Area (Acres)	Storage Capacity (Acre-Ft)
0	5.51		0
		5.57	
0.5	5.63		2.8
		5.69	
1.0	5.74		5.6
		5.80	
1.5	5.87		8.5
		5.94	
2.0	6.00		11.5
		6.06	
2.5	6.12		14.5
		6.18	
3.0	6.24		17.6

BY ...RAS... DATE ...2/6/80...

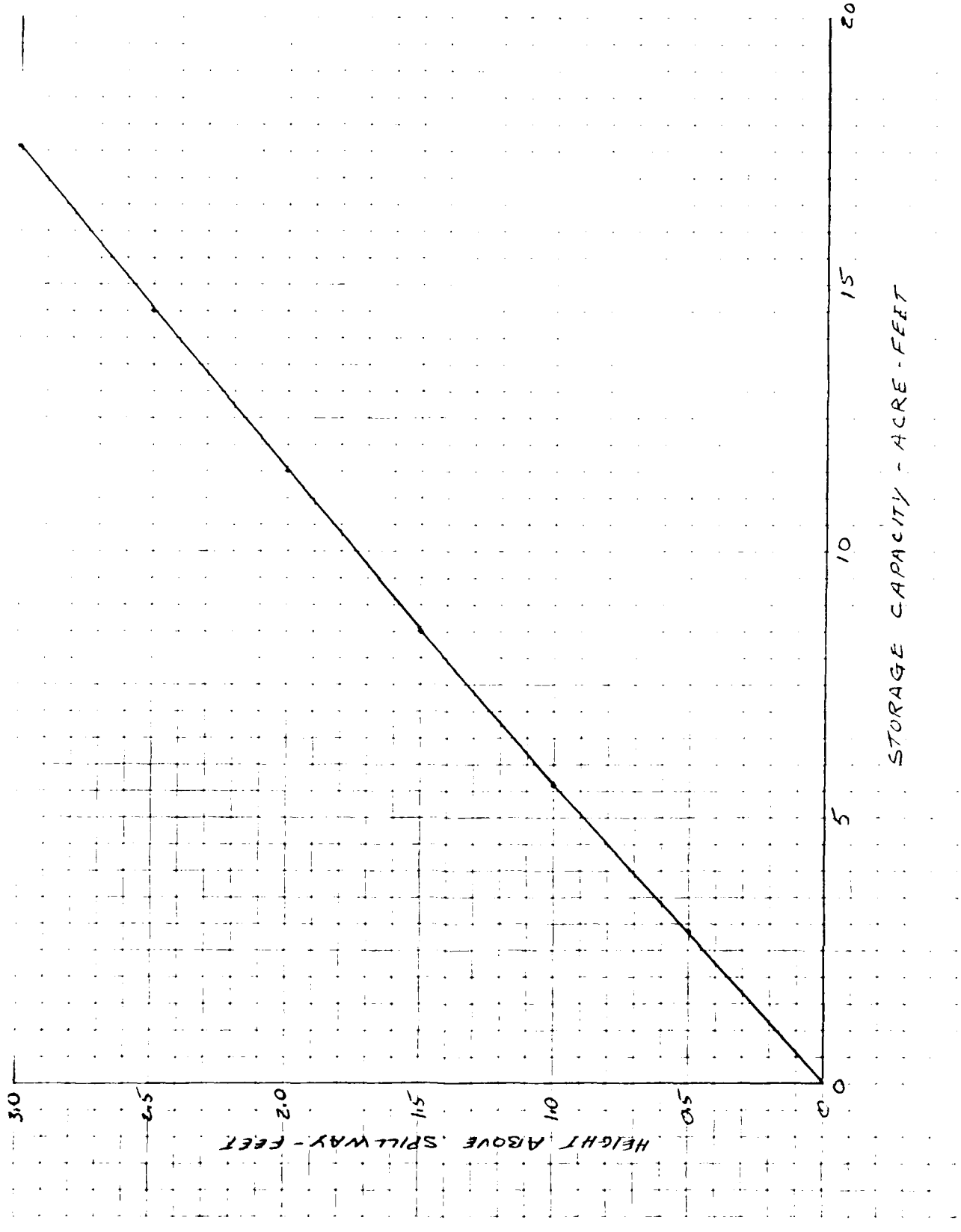
CHKD BY ...SL... DATE ...2/18/80...

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
8 Brookside Road - Waterbury, Conn. 06708

SHEET NO. ...4... OF ...12...

JOB NO. ...049-13...

SUBJECT ...FOUNTAIN LAKE DAM - SURCHARGE STORAGE CURVE...



BY ..... DATE ..... **ROALD HAESTAD, INC.** SHEET NO. 5 OF 12

CONSULTING ENGINEERS

CKD BY ..... DATE ..... 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 249-13

SUBJECT FOUNTAIN LAKE DAM - Test Flood

Test Flood = PMF

Drainage Area = 109 acres = 0.17 sq. miles

From Corps of Eng chart for "ROLLING" TERRAIN

MPF = 2,125 cfs/sq mile (2.0 sq. mi. Minimum)

PMF = 2,125 cfs/sq.mi. X 0.17 sq. mi = 361 cfs

Q_{P1} = 361 cfs

H_1 = 2.2 ft above Spillway, from Discharge Curve

$STOR_1$ = 13 ac-ft, From Area Capacity Curve

= 1.4" runoff from 0.17 sq. mi.

$Q_{P2} = Q_{P1}(1 - STOR_1/19) = 361 \text{ cfs}(1 - 1.4/19) = 334 \text{ cfs}$

H_2 = 2.2 ft $STOR_2$ = 13 ac-ft

$STOR_{AVE} = \frac{13 + 13}{2} = 13 \text{ ac-ft} = 1.4"$ runoff

$Q_{P3} = Q_{P1}(1 - STOR_{AVE}/19) = 361 \text{ cfs}(1 - 1.4/19) = 334 \text{ cfs}$

H_3 = 2.2 ft

Spillway Capacity $= CLH^{3/2}$

$= 2.8(22.3)(1.7)^{3/2}$

= 138 cfs

% of PMF = $(138/334) \times 100$ = 41 % of PMF

S = Reservoir Storage at time of failure = Storage at Spillway Level + Free board storage

S = 63 ac ft + (1.7 ft x 55.1 acres)

S = 72.37 Ac-Ft. USE 72 Ac-Ft.

Q_{p1} = Peak Failure Outflow = $\frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$

W_b = Breach Width - 40% of dam length at mid height
= (0.4)(175) = 70 ft

Y_o = Total height from river bed to pool level at failure
= 20 ft

$Q_{p1} = \frac{8}{27}(70)\sqrt{32.2}\,(20)^{3/2}$ = 10,527 use 10,500 cfs

SECTION NO 1: Reach Length = 300 ft

Assume 1) storage in the reach is negligible.
2) Culvert capacity is negligible.

$\therefore Q_{p1} = Q_{p2}$ = 10,500 cfs

H_2 = 6.0 ft

At this point it can be assumed that 50% of the flood waters will flow in the stream channel and 50% will flow down Fountain Lake Road. When the flood waters have passed Ansmor Road 75% will be flowing in the stream channel and 25% will continue to flow down Fountain Lake Road, Connecticut ROUTE 334.

SECTION NO 2 (ANSMOR ROAD) Reach Length = 600 ft

Q_{P2} = 10,500 cfs

H_2 = 5.0 ft A_2 = 547 sq ft

$V_2 = A_2 \times Length = (547\ ft^2 \times 600\ ft) \times 1\ ac\text{-}ft / 43{,}560\ ft^3 = 7.53$ use 8 ac-ft

V_2 is less than 1/2 of S ∴ reach is O.K.

$Q_{P3}\ (TRIAL) = Q_{P2}(1 - V_2/S) = 10{,}500\ cfs\ (1 - 8/72) = 9{,}333$ cfs

H_3 = 4.7 ft A_3 = 500 sq ft

$V_3 = A_3 \times Length = (500\ ft^2 \times 600\ ft) \times 1\ ac\text{-}ft / 43{,}560\ ft^3 = 6.88$ use 7 ac-ft

$V_{ave} = \frac{V_3 + V_2}{2} = \frac{7+8}{2} = 7.5$ ac-ft

$Q_{P3} = Q_{P2}(1 - V_{ave}/S) = 10{,}500\ cfs\ (1 - 7.5/72) = 9{,}406$ cfs

H_3 = 4.8 ft

SECTION NO 3 Reach Length = 700 sq ft

Q_{P3} = 75% of 9,406 cfs = 7,055 cfs

H_3 = 5.7 ft A_3 = 325 sq ft

$V_3 = A_3 \times Length = (325\ ft^2 \times 700\ ft) \times 1\ ac\text{-}ft / 43{,}560\ ft^3 = 5.22$ use 5 ac-ft

V_3 is less than 1/2 of S ∴ reach is O.K.

$Q_{P4}\ (TRIAL) = Q_{P3}(1 - V_3/S) = 7{,}055\ cfs\ (1 - 5/72) = 6{,}565$ cfs

H_4 = 5.5 ft A_4 = 300 sq ft

$V_4 = A_4 \times Length = (300\ ft^2 \times 700\ ft) \times 1\ ac\text{-}ft / 43{,}560\ ft^3 = 4.82$ use 5 ac-ft

$V_{ave} = \frac{V_4 + V_3}{2} = \frac{5+5}{2} = 5$ ac-ft

$Q_{P4} = Q_{P3}(1 - V_{ave}/S) = 7{,}055\ cfs\ (1 - 5/72) = 6{,}565$ cfs H_4 = 5.5 ft

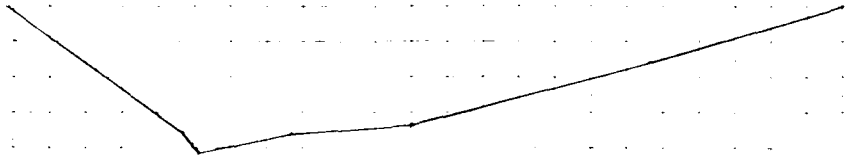
BY SL DATE 1/18/80 **ROALD HAESTAD, INC.** SHEET NO 8 OF 12

CKD BY DLS DATE 2/7/80 CONSULTING ENGINEERS 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

SUBJECT FOUNTAIN LAKE DAM - Flood Routing

SECTION NO 1 (FIELD SURVEYED) SEE FIGURE 5

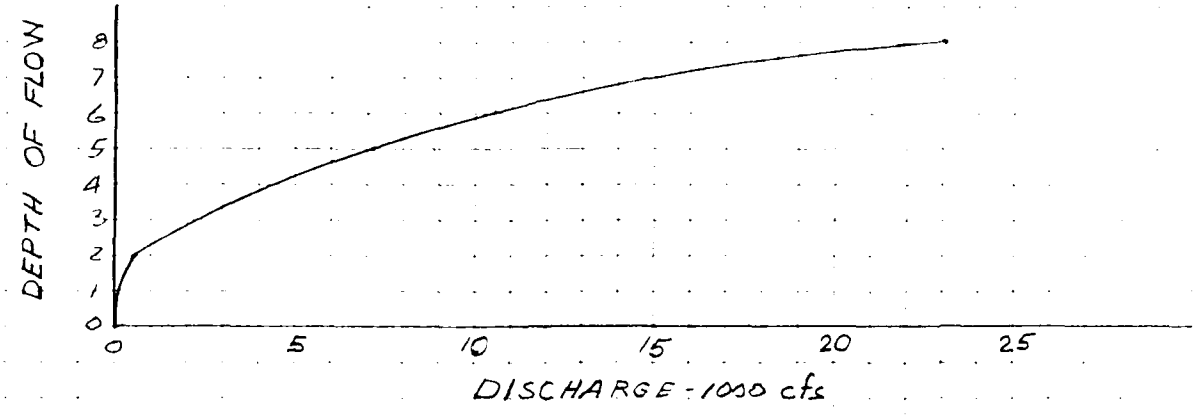
Scale: 1" = 10' Ver
1" = 40' Horiz

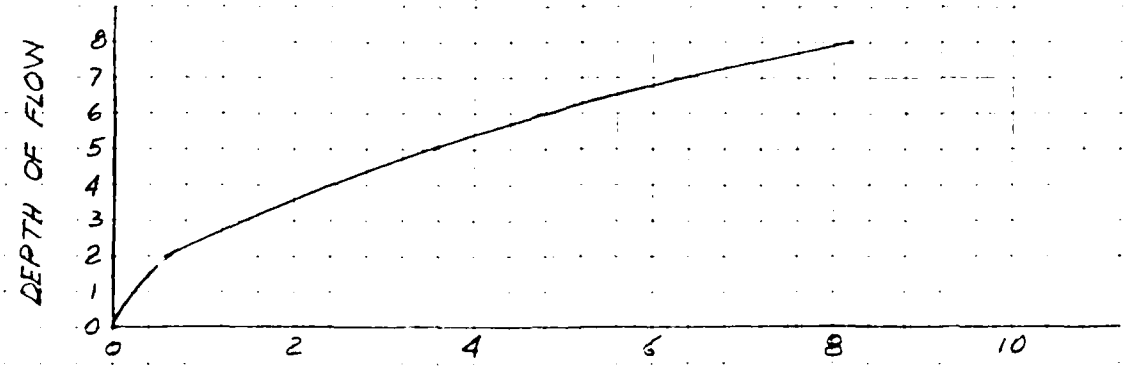


L = 300 ft
S = 0.083
n = 0.04

48" RCP

D	W_p	A	R	S	V	Q
2	69	59	0.86	0.083	9.7	572
5	137	355	2.59	0.083	20.2	7,171
8	194	820	4.23	0.083	28.1	23,042





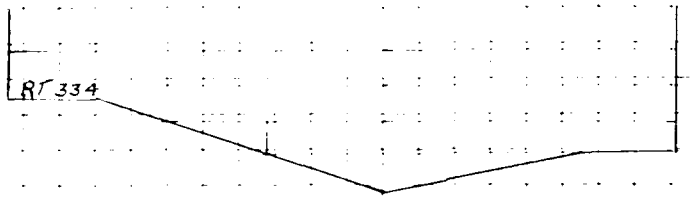
BY SL DATE 2/1/80 **ROALD HAESTAD, INC.** SHEET NO 9 OF 12

CONSULTING ENGINEERS

CKD BY DHS DATE 2/18/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

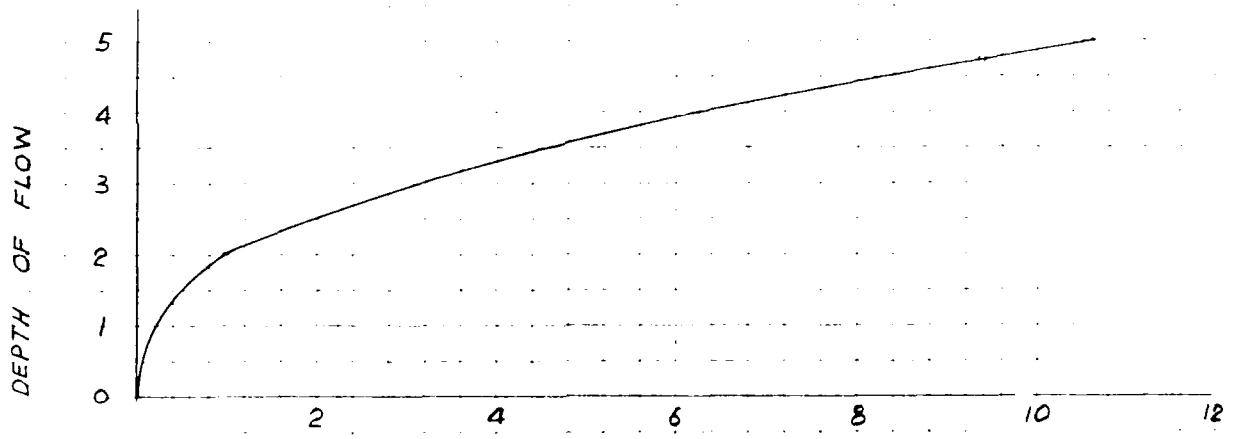
SUBJECT FOUNTAIN LAKE DAM - Flood Routing

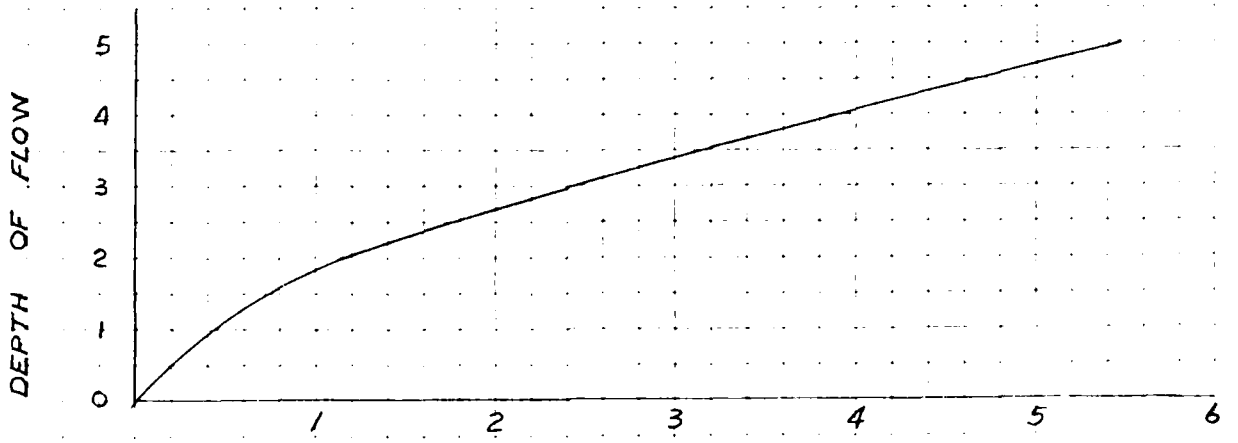
SECTION NO 2 (Ansmor Road) Scale 1" = 40' Horiz
1" = 5' Vert



L = 600 ft
s = 0.05
n = 0.04

D	Wp	A	R	S	V	Q
2	114	116	1.02	0.05	8.4	974
4	152	398	2.62	0.05	15.8	6,288
5	154	547	3.55	0.05	19.4	10,612





BY SL DATE 2/6/80 **ROALD HAESTAD, INC.** SHEET NO 10 OF 12

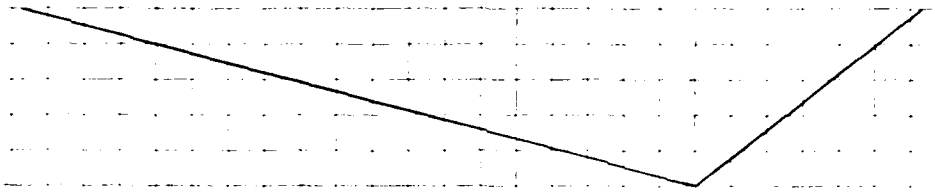
CONSULTING ENGINEERS

CKD BY DLS DATE 2/7/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

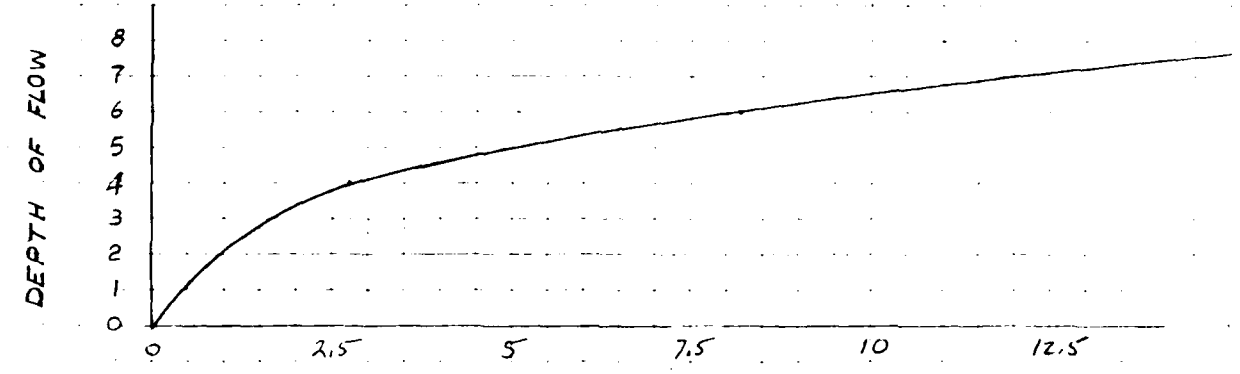
SUBJECT FOUNTAIN LAKE DAM - Flood Routing

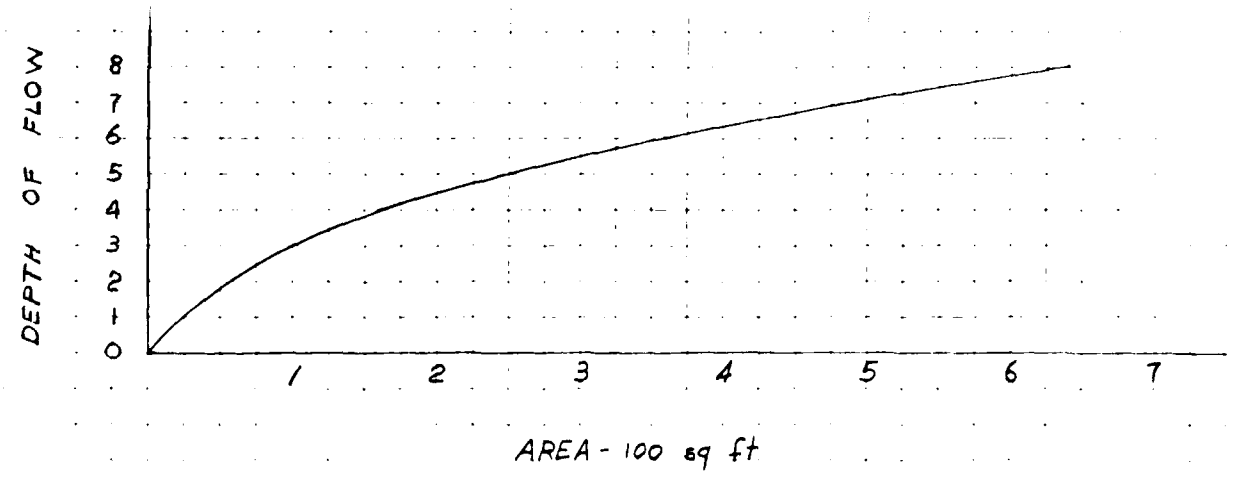
SECTION NO 3

Scale: 1" = 40' Horiz
1" = 10' Vert



D	Wp	A	R	S	V	Q
4	80	160	2.0	0.086	17.3	2,768
6	120	360	3.0	0.086	22.7	8,172
8	160	640	4.0	0.086	27.5	17,600





BY S.L. DATE 2/7/80 **ROALD HAESTAD, INC.** SHEET NO 11 OF 12
CONSULTING ENGINEERS
CKD BY D.A.S. DATE 2/18/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

SUBJECT FOUNTAIN LAKE DAM - Culvert Capacities

Reference "Hydraulic Charts for the Selection of Highway Culverts" HEC No. 5.

Culvert No 1 - (Route 334)

Size - 48" RCP

H_w max - 9 feet

Entrance Type - Square Edge With Headwall

H_w/D = 2.25 Qmax = 170 cfs

Culvert No 2 - (Ansmor Road)

Size - 48" RCP

H_w max - 6.3 feet

Entrance Type - Projecting

H_w/D = 1.58 Qmax = 130 cfs

Culvert No 3 - (Shopping Plaza Parking Lot)

Size - 54" RCP

H_w max - 10 feet

Entrance Type - Projecting

H_w/D = 2.22 Qmax = 210 cfs

Culvert No 4 - (Derby Ave. and Route 8)

Size - 8.5' W x 10' H

H_w max - 20 feet

Wingwall Flare - 30° to 75°

H_w/D = 2.0 Qmax = 1,615 cfs

BY SL DATE 2/7/80 **ROALD HAESTAD, INC.** SHEET NO 12 OF 12
CONSULTING ENGINEERS
CKD BY DLS DATE 2/7/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-13

SUBJECT FOUNTAIN LAKE DAM - Blowoff Capacity

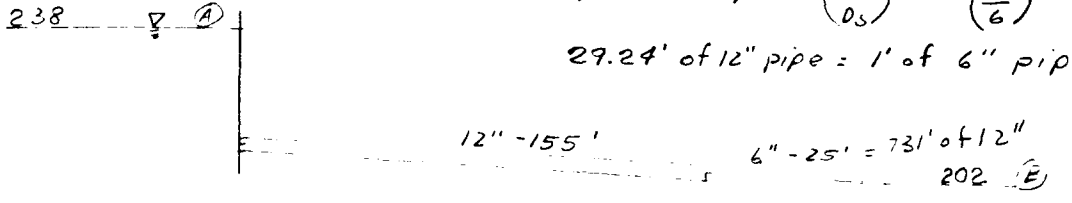
Blowoff consists of a 6" line connected to the 12" main.

Top of dam Elev. 238
Inv. of blowoff Elev. 202 (Assumed)

Head losses: 1) In the pipe = $f\left(\frac{L}{D}\right)\left(V^2/2g\right)$
2) 90° bend = $K\ V^2/2g$ ($k = 0.75$)
3) Gate Valve = $K\ V^2/2g$ ($k = 0.25$)
4) Sudden Contraction = $K\ V^2/2g$ ($k = 0.37$)

Equiv Length = $\left(\frac{D_L}{D_S}\right)^{4.87} = \left(\frac{12}{6}\right)^{4.87} = 29.24$

29.24' of 12" pipe = 1' of 6" pipe



$$P_A + V_A^2/2g + Z_A - H_L = P_B + V_B^2/2g + Z_B$$

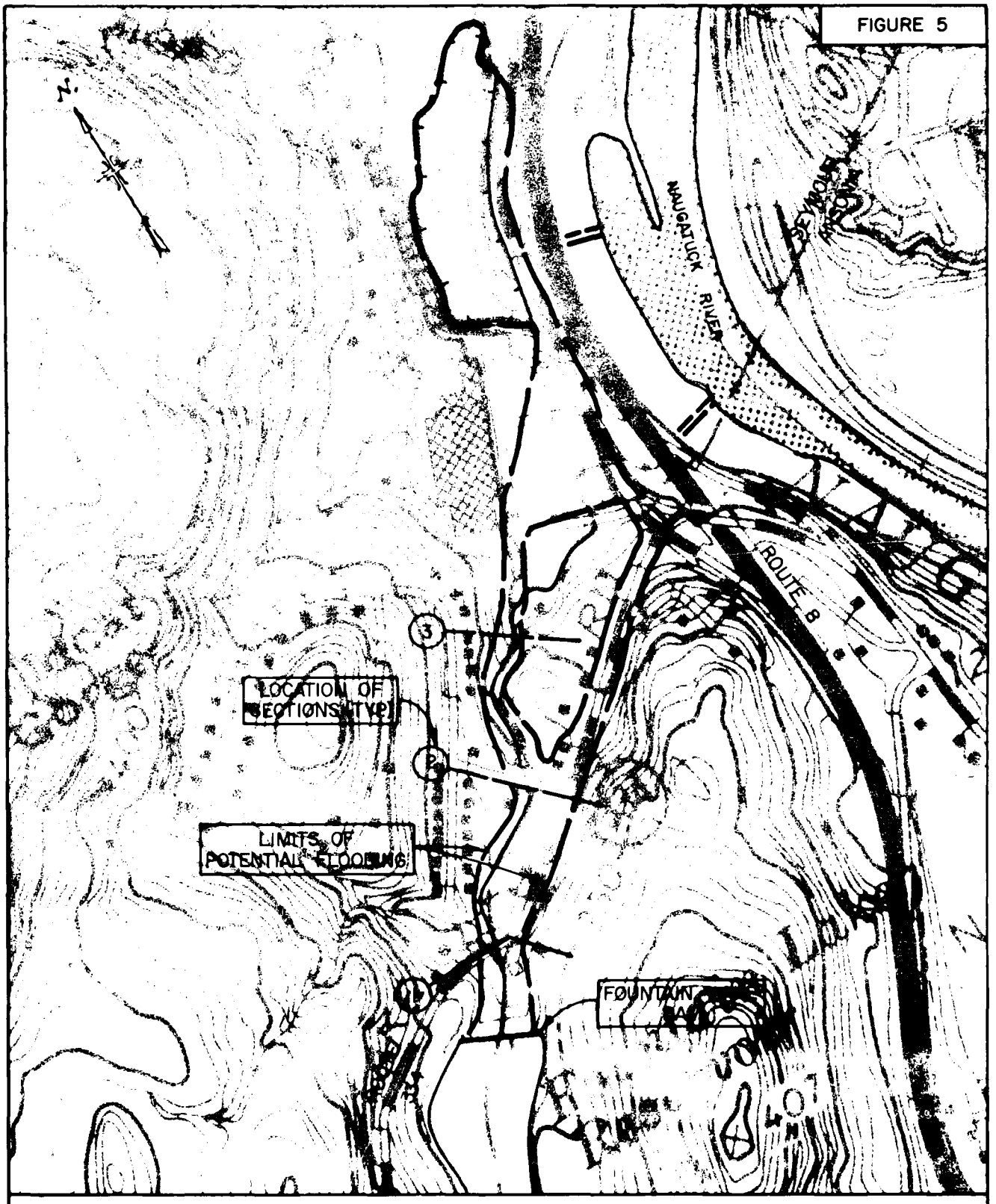
$$0 + 0 + 36 - \left[886(f) + 0.75 + 0.25 + 0.37\right] V_B^2/2g = 0 + V_B^2/2g + 0$$

$$36 - \left[886f + 1.37\right] V_B^2/2g = V_B^2/2g$$

Assume	$V = 3$ ft/sec	$\rightarrow f = 0.0395$	$\therefore$	$V = 7.9$ ft/sec
	$V = 6$ ft/sec	$\rightarrow f = 0.0385$	$\therefore$	$V = 8.0$ ft/sec
	$V = 8$ ft/sec	$\rightarrow f = 0.0380$	$\therefore$	$V = 8.0$ ft/sec

$$Q = VA = 8 \text{ ft/sec} \left(\pi (1)^2/4\right) = 6 \text{ cfs}$$

FIGURE 5



LIMITS OF POTENTIAL FLOODING

FOUNTAIN LAKE DAM
ANSONIA-SEYMOUR, CONNECTICUT

SCALE: 1" = 500'

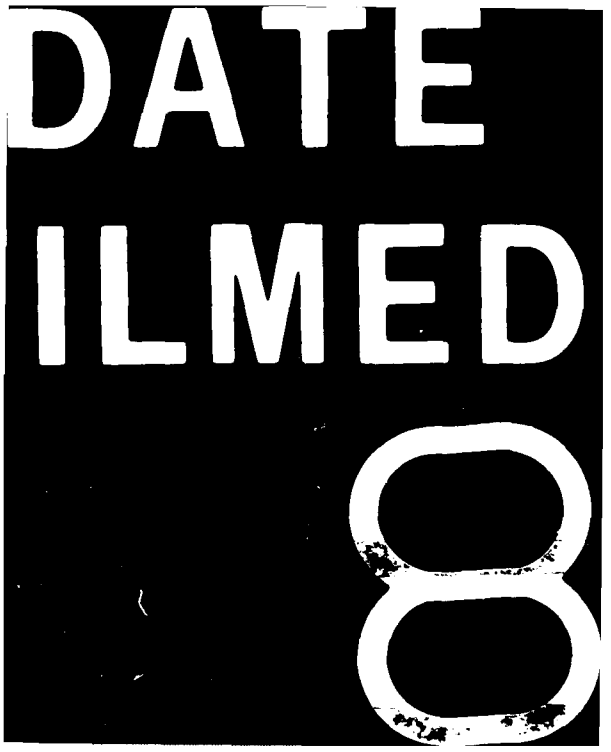
ROALD HAESTAD, INC.

ANSONIA QUADRANGLE 1972

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS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